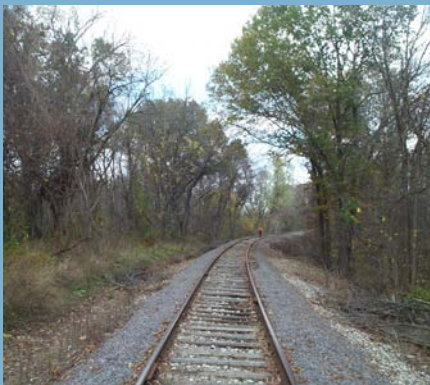




SOUTH LIBERTY PARKWAY SECTION STUDY FULL REPORT



Prepared By:

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SOUTH LIBERTY PARKWAY SECTION STUDY

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1.0 Executive Summary

In October of 2001, the HNTB team of HNTB and Economic Research Associates, Inc. was hired to develop a corridor study for Phase 1 of South Liberty Parkway from I-35 to the Withers Road extension in conjunction with the engineering design of the corridor. The corridor study would include the following:

- A Land Use Summary Report
 - A Transportation Summary Report
 - A Travel Demand Model Technical Report
 - Supporting Appendices
- A refinement of the future land use designations along the corridor
 - A traffic analysis for the corridor from I-35 to M-291
 - A detailed review and update of the market conditions and development opportunities for the corridor that were researched during the original corridor study
 - Supporting Appendices

Phase 1 of the corridor study was completed in October 2003 and construction began in the Spring of 2004. Construction is expected to be completed for Phase 1 by the Fall of 2006. The Phase I Corridor Study was presented to the City Council and Planning Commission in February of 2004. At that time the City Council and Planning Commission decided to expand the original corridor study into a full section study, updating the City's expectations for land use, transportation, and economic potential for the corridor.

In June of 2004, the HNTB team, with the addition of Hall Planning and Engineering, Inc. was directed to complete this larger section study for the entire South Liberty Parkway Corridor from I-35 to M-291. The section study will serve as an amendment to the comprehensive plan, the guiding policy document for the City. The section study area is bounded by I-35 on the west, M-291 to the east, Ruth Ewing Road to the north, and Seven Hills Road/Old 210 to the south. The full section study includes the following components:

- A conceptual alignment for Phase 2 of the Parkway (Withers to M-291)

This report has been divided into two documents. The first document, "South Liberty Parkway Section Study Executive Summary", contains this Executive Summary and is intended to provide a brief overview for elected officials of the study results. The second document, "South Liberty Parkway Section Study Full Report" is a 217 page document that contains the Executive Summary and all the supporting technical information and research that went into creating the study. It is intended to be used by the City's technical staff as a more detailed planning tool.

Alignment of the Parkway

In September of 2004, a Community Design Charrette was held to develop feasible alternatives, typical sections, and to locate possible areas for neighborhood centers along Phase 2 of the Parkway. Based on the week long charrette, a North Alignment (see **Exhibit 1**) and a South Alignment (see **Exhibit 2**) were developed. The North Alignment intersects with M-291 at Ruth Ewing Road and the South Alignment intersects M-291 approximately 3,800' south of Ruth Ewing.

Following the design charrette, the HNTB team prepared a conceptual design, costs, and a list of pros and cons for each of the alignments. Based on the

analysis, the South Alignment was recommended. This recommendation was presented at the March 7th, 2005 joint City Council and Planning Commission Meeting. During the discussion a third option was suggested, an alignment that would tie directly into the existing Seven Hills Road Intersection at M-291. The HNTB team expanded the analysis to include the third option. Even with the analysis of the third option, the South Alignment remained the recommended alignment.

Future Land Uses

As the first step in refining land uses along the corridor, a land use charrette was held at the Liberty Community Center on April 18th, 2005. Approximately sixty citizens attended the charrette. The purpose of the charrette was to evaluate the land uses along South Liberty Parkway Phases 1 and 2 and to make recommendations on how development should occur. Following a brief presentation on the types of land uses allowed in the City of Liberty, those in attendance separated into four groups and developed their recommendations. Each group then presented and discussed their recommendations with those in attendance.

Following the charrette, the HNTB team developed a consensus plan taking the best elements of the four plans created. On May 9th, 2005 a meeting was held to allow the affected property owners to comment and provide recommendations to the plan. A few minor changes were recommended and incorporated into the Consensus Land Use Plan (see **Exhibit 3**). On May 16th, 2005, the Consensus Land Use Plan and the South Alignment were presented at a joint City Council and Planning Commission Meeting. Since that time, minor changes have been made to respond to the wishes of individual land owners in the study area. These changes have been incorporated into this document.

Traffic Study

The primary goal of the study was to develop a planning process which would analyze existing and proposed roadways in the City including the South Liberty Parkway. A travel demand model was created in 2002 to provide future travel characteristics of primary roadway facilities based on forecasted land use. This is not a one time use tool. This is a tool that the City can continue to use in the future. As the study was expanded into a full section study, the traffic model was updated with the revised land use and South Liberty Parkway was re-evaluated. The travel demand model provides a macro-level transportation planning tool. A simulation model was created to analyze traffic operation characteristics at a micro-level for the South Liberty Parkway corridor, In particular the area between M-291 and Birmingham Road that is planned for a neighborhood center. Preliminary traffic analysis conclusions indicate that within the capabilities of Synchro to accurately model a multi-way boulevard, the proposed town center network is capable of providing a safe and efficient operating system for all modes of travel.

The Traffic analysis results indicate that a 4-lane facility for South Liberty Parkway will generally serve the entire corridor with anticipated development using good access management guidelines. The one exception is the most heavily traveled roadway segment on South Liberty Parkway, I-35 to Flintlock, which is expected to carry local and through traffic. The heavy traffic demand at this location may require a 6-lane section before 2025. The City may also consider revising downward the land use density on the west side of the corridor in order to eliminate the need for a 6-lane section.

Another concern is the intersection of Stewart

Road and South Liberty Parkway. In 2010, this intersection operates at an unacceptable level of service for a stop controlled intersection. In order to accommodate this intersection, roadway geometrics are compromised and thus create undesirable operating conditions for South Liberty Parkway. Elimination of the eastbound access to Stewart as early as possible will improve operations in this part of the corridor.

Preliminary traffic analysis conclusions indicate that within the capabilities of Synchro to accurately model a multi-way boulevard, the proposed town center network is capable of providing a safe and efficient operating system for all modes of travel.

From the Traffic Analysis several priorities were identified. These priorities were ranked based on the greatest impact to overall City wide traffic benefits and economic development. They are:

1. Complete South Liberty Parkway from Withers Road to M-291.
2. Construct Flintlock Road from 76th Street to South Liberty Parkway.
3. Complete the other planned and committed projects identified by the City.

With the recent acquisition of Federal funding for the Flintlock overpass, it is likely that Flintlock Road from 76th Street to South Liberty Parkway will be completed first. While this does not have as significant and overall benefit to the City of Liberty as completing South Liberty Parkway, it will have substantial economic and traffic benefits to the City.

Economic Analysis

Following the adoption of the Consensus Land Use Plan and the South Alignment, the HNTB team revised the City Travel Demand Model and developed the Economic Analysis for the South Liberty Parkway Corridor. The analysis included

potential revenue generation and the supportable infrastructure investment resulting from the planned land use and projected traffic along the corridor. The analysis also served to update the analysis prepared in 2003 as part of the South Liberty Parkway Corridor Study.

Based on tax rates, land use, and the associated development potential in the corridor, the economic analysis projects that total 40-year fiscal revenues to the City of Liberty will be approximately \$291 million; \$75 million over the first 20 years. This expanded development program is also predicted to result in \$88 million in supportable public investment over a 40 year period, \$39 million of which occurs in the first 20 years.

Conclusions

South Liberty Parkway will greatly improve mobility for travelers between I-35 and M-291 across southern portions of Liberty. The new parkway will also open approximately 3,600 acres of land for new development once it is completed. This Section Study, when approved by the City Council and Planning Commission, will serve as an amendment to the Comprehensive Plan. The amendment has been prepared with the support and involvement of the City of Liberty's citizens, affected land owners, and elected officials. It will serve as guide for future growth and construction within this southern portion of the City of Liberty.

Next Steps

Following the adoption of this section study, there are several steps that the City should consider to continue good planning for its future transportation needs. They area:

- Prioritization of Planned and Committed Projects – Using the new travel demand model, projects listed as either committed or planned can be prioritized based on benefits to motorists.

The model helped show that building the South Liberty Parkway extension from Withers Road to M-291 provided greater benefits to Liberty motorists than the Flintlock improvement. This same kind of analysis approach could be developed for each committed and planned project.

- Growth Management – Discussion of where land use assumptions may be high based on where level of service problems and traffic demand exist in the future. The GIS functionality of the travel demand model can identify these issues. This can help improve the City's comprehensive planning process.
- Discussions with Neighbors – Much of the growth in this area is expected to occur west of the City of Liberty in Kansas City, Missouri. Projects such as the Flintlock overpass will benefit both Liberty and Kansas City, Missouri residents. Discussion with surrounding neighbors and MoDOT will promote good transportation planning.

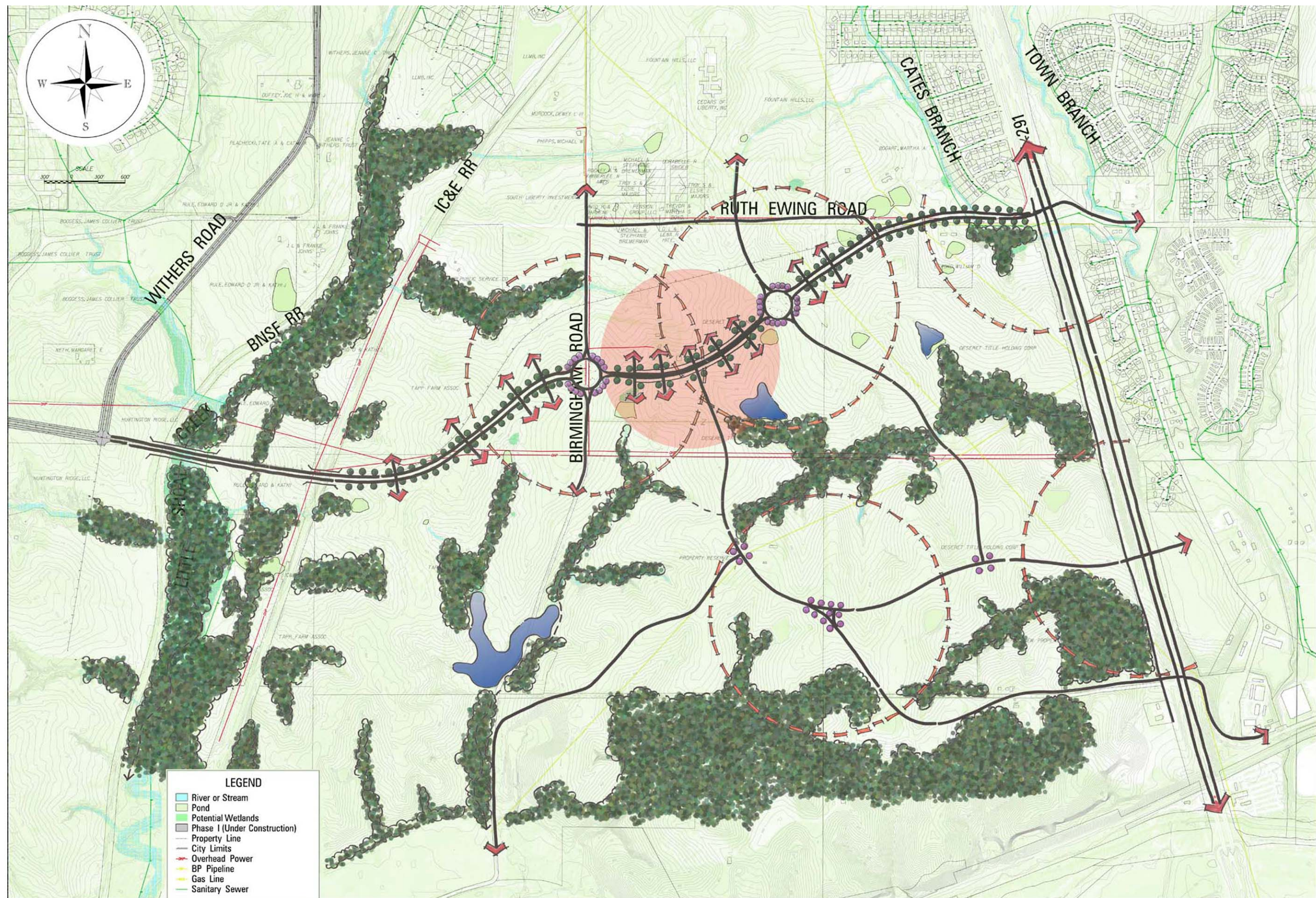
Since Phase 2 of South Liberty Parkway was identified as the City's highest priority, there are several steps that should also be considered to keep the Phase 2 project moving forward. Negotiations should continue with the major property owners outside the City limits in order to obtain some commitment to future annexation. Additional funding resources should be investigated including Tax Increment Financing (TIF), Transportation Development Districts (TDD), Federal Aid Programs, and possibly a continuation of the ballot issue that helped to finance Phase 1. More detailed design should proceed on Phase 2 of the Parkway in order to:

- Develop more detailed construction costs for budget planning.
- Identify specific right of way and

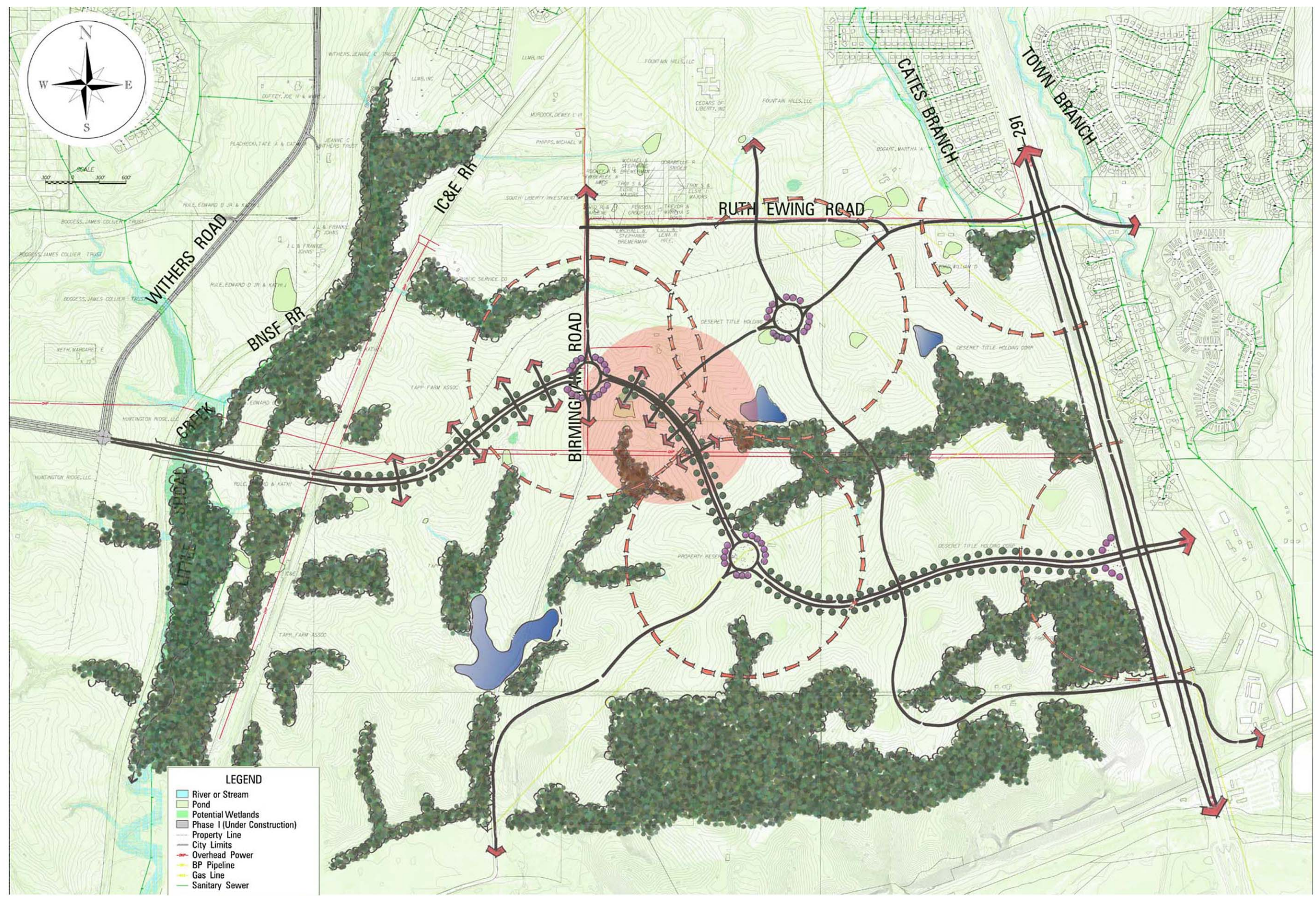
easement requirements, grading, and property impacts, in order to work with new developments as they enter the planning stages.

- Develop a staging plan for the parkway should funding not be available for the entire Phase 2 project.
- Identify specific utility impacts and begin working with the utility companies on relocation planning.

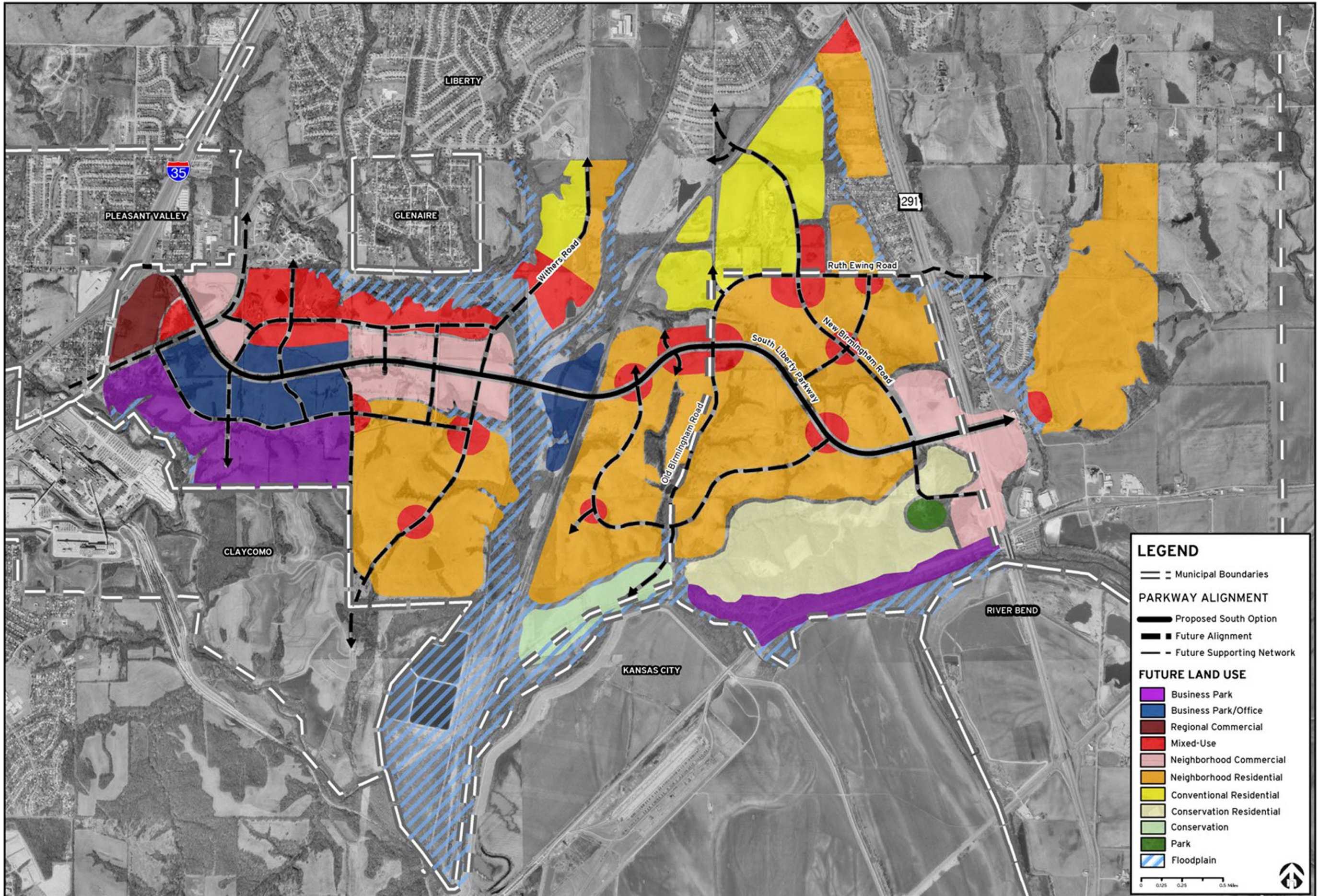
Identifying these items early will assist the City in proper budget and community planning, helping Phase 2 of South Liberty Parkway become a reality.



South Liberty Parkway Section Study
South Charrette Alignment



South Liberty Parkway Section Study
Consensus Land Use Plan



2.0 Introduction

In October of 2001, the HNTB team of HNTB and Economic Research Associates, Inc. was hired to develop a corridor study for Phase 1 of South Liberty Parkway from I-35 to the Withers Road extension in conjunction with the engineering design of the corridor. The corridor study would include the following:

- A Land Use Summary Report
- A Transportation Summary Report
- A Travel Demand Model Technical Report
- Supporting Appendices

Phase 1 of the corridor study was completed in October 2003 and construction began in the Spring of 2004. Construction is expected to be completed for Phase 1 by the Fall of 2006. The Phase I Corridor Study was presented to the City Council and Planning Commission in February of 2004. At that time the City Council and Planning Commission decided to expand the original corridor study into a full section study, updating the City's expectations for land use, transportation, and economic potential for the corridor.

In June of 2004, the HNTB team, with the addition of Hall Planning and Engineering, Inc. was directed to complete this larger section study for the entire South Liberty Parkway Corridor from I-35 to M-291. HNTB's Phase 2 team consists of the following professionals:

- **HNTB Corporation** – Responsible for study management, conceptual engineering design, land use development, and traffic analysis.
- **Hall Planning and Engineering, Inc.** – Responsible for developing neighborhood residential guidelines,

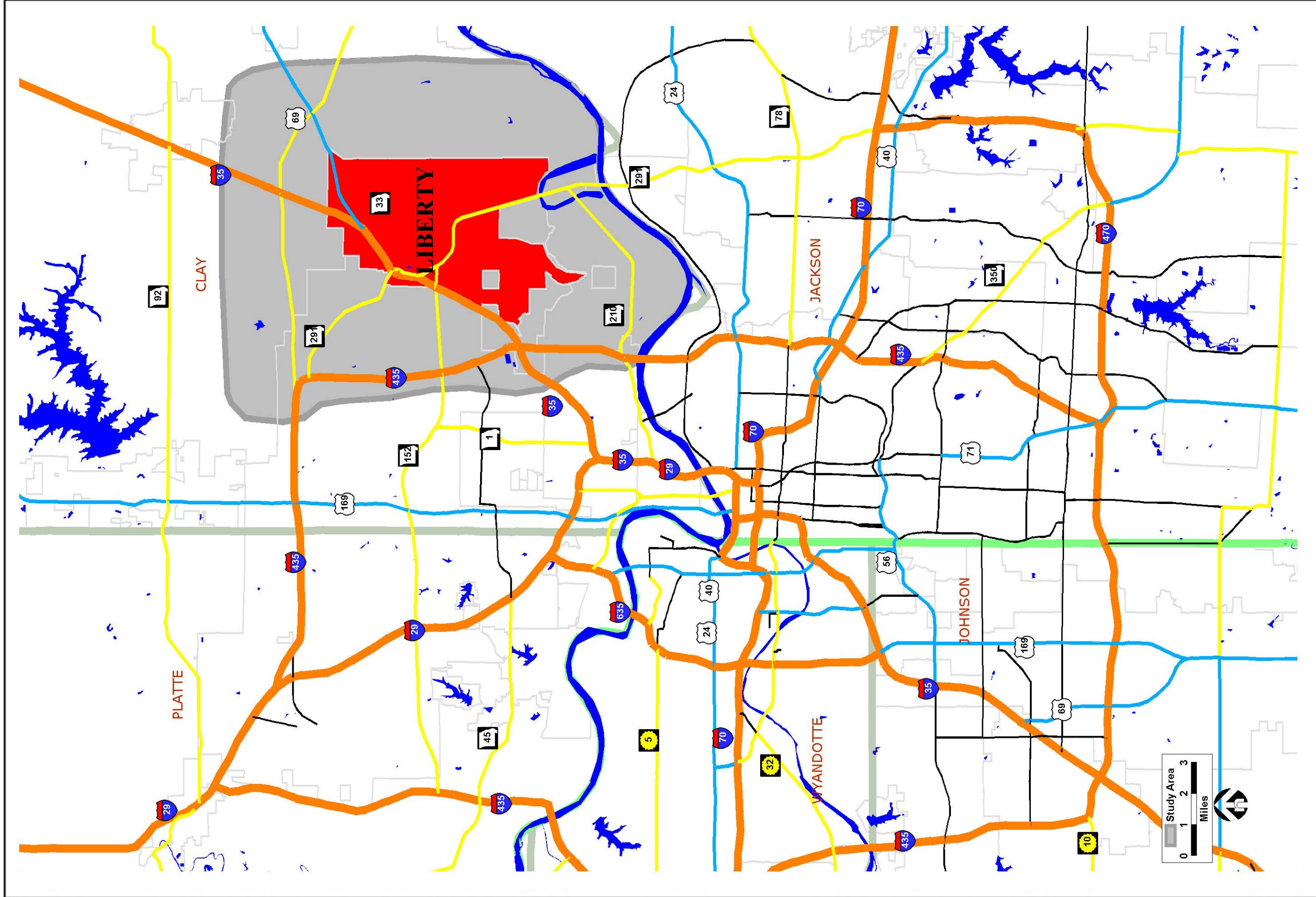
typical sections, and detailed traffic modeling of the neighborhood residential cores.

- **Economic Research Associates, Inc.** – Responsible for research and preparation of the Market Analysis and Value Capture updates within the corridor.

This section study will expand the original corridor study, updating the City's expectations for land use, transportation, and economic potential for the corridor. The section study will also serve as an amendment to the comprehensive plan, the guiding policy document for the City. The section study area is bounded by I-35 on the West, M-291 to the East, Ruth Ewing Road to the North, and Seven Hills Road/Old 210 to the South (see **Exhibit 4**). This section study includes the following components:

- A conceptual alignment for Phase 2 (Withers Road to M-291).
- A refinement of the future land use designations along the corridor from I-35 to M-291.
- A transportation analysis and traffic model for the corridor from I-35 to M-291.
- A detailed review of the market conditions and development opportunities for the corridor from I-35 to M-291.

In the spirit of the original "Blueprint for Liberty", this study has been prepared with extensive community involvement including citizens, elected officials, and affected land owners. This is to ensure that the document represents the thoughts of the citizens of Liberty and captures their goals for the South Liberty Parkway Corridor.



3.0 Alignment Study

In June of 2004, with Phase 1 of South Liberty Parkway under construction, the City of Liberty began to look at completing a section study of the Parkway, from I-35 to M-291. One of the key components of the section study would be developing the preferred alignment from Withers Road to M-291. It was also the City's desire to work more closely with the landowners and public than was done in Phase 1. This is primarily because the Phase 2 alignment study area is comprised of several large landowners who could be significantly impacted by the alignment. Another factor requiring the close coordination was the City's desire to develop an alignment and a typical section that would allow for the development of a neighborhood residential development along the corridor. This type of development would be consistent with the existing City Future Land Use plan. These developments are more easily developed when dealing with only one or two landowners, similar to the area around Phase 2 of South Liberty Parkway. The typical section needed to also be flexible enough to accommodate a higher speed facility should the area develop in a more conventional pattern instead of the proposed neighborhood residential.

Existing Conditions

In an effort to identify key features of interest within the project corridor, the study area was walked by members of the HNTB Environmental Planning Group. Listed below are the findings from their preliminary environmental screening:

- **Streams** – The major stream within the project area is the Little Shoal Creek, a perennial stream flowing from north to south, located on the west end of the project area between the UP and BNSF railroad tracks. Two other perennial
- **Wetlands** – The majority of potential wetlands shown on the National Wetlands Inventory maps are located along Little Shoal Creek. The majority of these are of the Palustrine Forested and Palustrine Emergent types. There are also a few other potential forested



Little Shoal Creek

streams, Cates Branch and Town Branch flow from north to south and are located on the east end of the project area. Most of the Cates Branch is located west of M-291, and the Town Branch is located east of M-291. Little Shoal Creek has extensive riparian woodlands, while the other two major streams have narrower riparian woodland areas. There are also several smaller intermittent streams within the project area that have associated riparian woodland areas. Within the Potential Parkway Limits, there would be a crossing at Little Shoal Creek and one at Cates Branch. There would also be some impact to an intermittent stream near Birmingham Road.



Upland Pond

and emergent wetlands scattered throughout the project area. In addition, there are several upland ponds. These appear to be void of extensive vegetated wetland areas. Within the study area, there would be impacts to two potential forested wetland areas at the Little Shoal Creek crossing (a more detailed study would need to be done to determine if these may or may not be jurisdictional). There could also be impacts to three small areas of potential emergent and forested wetlands at the edges of the corridor. In addition, three upland ponds could be impacted. It does appear that the study area crosses the Little Shoal Creek Palustrine Forested wetlands at a narrow point, which is beneficial in the evaluation process because there is less potential for impacts when the project goes into the more detailed design phases.

- **Floodplains** – The majority of the 100-year floodplain is located adjacent to Little Shoal Creek, where the width of the floodplain varies between approximately 725 to 800 feet. A north tributary of

Little Shoal Creek has a floodplain width that varies between approximately 150 and 300 feet. In addition, the Cates Branch and Town Branch floodplains vary in width between approximately 150 to 250 feet. Within the study area, the 100-year floodplains of Little Shoal Creek and the Cates Branch would be crossed.

- **Prime Farmland** – Soils in the project area that are designated as Prime Farmland are concentrated in the floodplain of the Little Shoal Creek and its north tributary, as these are the areas that tend to be level or gently sloping. The remainder of the project area is moderately hilly and as such the only other areas of prime farmland are located on the gently sloping ridge tops and are relatively narrow. Within the study area the amounts of prime farmland are relatively minimal.
- **Hazardous Waste Sites** – Hazardous waste site databases indicated that four sites are located within the project area. There are two that are in or adjacent to the study area. One is the Harmony Printing and Lithography Company (Hazardous Waste Generator and Air Pollution Control Program Site) located on Ruth Ewing Road, about ½ mile west of M-291. The other is the Cedars of Liberty (Petroleum Tank) located on Ruth Ewing Road near Cates Branch. The two other sites in the project area are the United Coop (Licensed Pesticide Applicator) located in the northeast corner of the project area, adjacent to M-291, and Chemtech Industries

(Vulnerability Assessment Database) located east of Birmingham Road in the southern quarter of the project area. (The sites listed above have not been verified.)

- **Parks & Recreation Areas** – None exist in the project area.
- **Schools** – Although no schools currently exist within the project area, according to the Geographic Names Information System, the Ewing School was once located in the vicinity of M-291/Ruth Ewing Road, on the east side of M-291.
- **Cemeteries** – No cemeteries exist within the project area.
- **Cultural Resources** – The Cultural Resources screening utilized web-based data sources. The National Park Service (NPS) National Register of Historic Places (NRHP) was reviewed. There are 29 properties and districts listed on the NRHP in Clay County, 14 of which are in Liberty. None of the listed properties (8) or districts (5) are located within the South Liberty Parkway study corridor. One archeological site was noted in the NRHP list, Nebo Hill Archeological site, which is address restricted by the State Historic Preservation Office (SHPO) in order to maintain the integrity of the site and respect private property rights, and therefore not located at this time.

Properties over 50 years of age need to be surveyed for historic significance and for potential NRHP eligibility. Those properties within the Area of Potential Effect (APE) will need to be surveyed for



Existing Farmstead

eligibility and those which are acquired for the proposed action will need to be evaluated. As the corridor is refined to a more discrete alignment, the Missouri Department of Natural Resources (MDNR) Historic Preservation Program (HPP) and the Archeological Survey of Missouri (ASM) data bases and files can be more closely examined for the Nebo Hill Archeological Site and other archeological sites.

- **Residential Areas and Buildings** – There are two residential neighborhoods in the project area, both of which are adjacent to M-291, one on the west side and one on the east side. In addition, there is a farmstead east of Birmingham Road in the middle of the project area, and some scattered residences and buildings along Ruth Ewing Road. In addition, the Helping Hand Farm is located at the south edge of the project area, east of Birmingham Road. Within the Potential Parkway Limits, the only potential displacements are located west of the Cates Branch and south of Ruth Ewing Road where there is a residence/

out-building complex.

- **Utilities** – A number of existing utilities were identified within the study area. At this stage of the concept study, a detailed investigation of utilities was not completed. The major utilities were contacted and as-built maps were requested. Utilities were also visually verified during visits to the study area. The following major utilities were identified from the as builts received and the field visits:
 - **BP** - 2 major transmission lines in the project area. The first crosses



Existing Utilities in the Study Area

Ruth Ewing Road approximately 2,400' west of M-291 and heads southeast, eventually crossing M-291 approximately 4,500' south of Ruth Ewing Road. Their second line crosses M-291 approximately 1,800' south of Ruth Ewing and heads southwest, eventually crossing Seven Hills Road approximately 700' east of Birmingham Road.

- **Aquilla** - Overhead line along Ruth Ewing Road between M-291 and Birmingham Road. Line continues west of Birmingham to a substation just west of Birmingham.
- **KCPL** - They have a transmission line running north and south along the IC&E Railroad. A second line runs east and west along the north line of Sections 29 and 30. A third line runs to the South along M-291 from the north line of Section 29.
- **SBC** - Copper and fiber lines run along Ruth Ewing Road as well as along M-291. An overhead line runs along Birmingham. Hardware cabinets are located north of Ruth Ewing Road approximately 600' west of M-291.
- **Missouri Gas Energy** - Line runs along Ruth Ewing Road between M-291 and Birmingham Road.

Should the alignment for South Liberty Parkway – Phase 2 move forward into design, more extensive utility investigations and coordination will be required.

Parkway Design Charrette

A design charrette was held for South Liberty Parkway September 21-24, 2004. The purpose of the charrette was as follows:

- Gain public input and support for the design of South Liberty Parkway
- Develop multiple conceptual alignment options for the Parkway
- Develop Parkway typical sections that promote walkability in the neighborhood centers
- Identify possible neighborhood centers

The charrette was administered by HNTB Corporation and Hall Planning and Engineering, Inc. The charrette team consisted of the following City Council, Planning Commission, City Staff, and Consultant members:

- **Liberty City Council** - Juarenne Hester; Jim Robertson; Bill Parker; Lyndell Brenton
- **Liberty Planning Commission** - Charles Small; Patti Banks



Charrette Team Discussing Options

- **Liberty City Staff** - Steve Anderson, Director of Planning and Development; Steve Hansen, Director of Public Works; Brian Hess, Civil Engineer; LaTonya Hill, Development Engineer; Jackie Carlson, Planner; Lisa Pool, Planner
- **Consultants** - Kevin Wallace, HNTB Project Manager; Scott Heavin, HNTB, Project Engineer; Andy Stratton, HNTB, Civil Engineer; Jason Meier, HNTB Urban Planner; Rick Hall, Hall Engineering, Transportation Planner

Over the four day period, over one hundred charrette participants engaged in a number of activities to develop the options for South Liberty Parkway. The activities were divided into the following categories:

- **Kick Off Meeting** - Information was presented about the South Liberty Parkway - Phase 2 Concept Study and the outline of the charrette agenda. Participants heard about the purpose, goals and challenges of the project and the charrette process.
- **Group Meetings** - Specific groups of people such as local business owners, property owners, government representatives, developers, citizen volunteers and others were given the opportunity to present their views and ideas. The Charrette Team was present to test suggested ideas and to display the results.
- **Design Development** - From the input received, the Charrette Team

developed recommended conceptual layouts for South Liberty Parkway and potential land access patterns in the adjacent corridor. The concept was based on discussion and testing of the alternative concepts developed during the charrette.

- **Final Presentation** - Parkway design concepts, nearby street concepts, and special intersection treatments were presented. A conceptual recommendation was developed as a basis for preliminary and final design for the parkway.

The schedule for the event is shown in **Table 1**.

Preferred Alignment Options

During the four day charrette, several alignment options were reviewed for Phase 2 of South Liberty Parkway. During the working sessions, members

of the charrette team and the public divided into multiple groups and made recommendations for the possible alignment of the Parkway. A number of factors were considered during the development of the charrette alignments. They were:

- Parkway Design Criteria
- Potential for Adjacent Development
- Existing Utilities
- Stream Crossings
- Railroad Crossings
- Existing Terrain
- Impacts to the Natural Environment
- Impacts to Existing Property
- Locations for Future Neighborhood Centers
- Future Extensions of the Parkway East of M-291
- Intersection Safety at M-291

Over the course of the four day charrette, two alignments were developed that would be carried forward for further study. These alignments, the

	Tuesday, 9/21	Wednesday, 9/22	Thursday, 9/23	Friday, 9/24
8:30 am – 10:00 am		Elected and Appointed Government Officials		
10:30 am – 1:00 pm		Police Department Fire Department Parks Department Public Works Department Liberty Public Schools Liberty Hospital Clay County State of Missouri Utility Providers	Affected Property Owners	Design Development
2:00 pm – 3:30 pm	Charrette Team	Chamber of Commerce Realtors Builders Developers Engineers Architects	Design Development	
4:00 pm – 5:30 pm		Citizen Volunteers [Blueprint for Liberty]		Final Presentation 4:00 – 6:00
6:30 pm – 8:00 pm	Kick Off Presentation			
All Day		Charrette Team	Charrette Team	Charrette Team

Table 1: Charrette Schedule

North Alignment and the South Alignment, are shown in **Exhibit 1** and **Exhibit 2**.

Neighborhood Centers

During the development of the alignment options, several locations were reviewed for future neighborhood centers. These developments are characterized by Mixed-Use Development surrounded by Neighborhood Residential land uses (see **Section 4.0 Land Use Descriptions**). These areas would be pedestrian oriented, permitting a combination of retail, office and residential uses similar to the area around the Liberty Square. In addition to encouraging ground floor retail with second story office or residential, these areas also require greater attention to architecture and design. Single-family attached townhouses are encouraged in these areas and apartments are also permitted. These areas are typically sized by locating a quarter mile radius circle from the center of the development. This would represent the distance a person could walk in a five minute period.

Typically these areas are centered on a public facility such as a government building, library, park, or other recreational feature. **Figure 1** shows this quarter mile radius concept superimposed over the Liberty square. These areas are indicated in **Exhibits 1 and 2** by the dashed red circles and shading.

Parkway Typical Section

The typical section that was developed for Phase 1 of the parkway consists of wide lanes, a 28 foot median, and wide outside parkways. A conceptual plan view is shown in **Figure 2** and a typical section can be seen in **Figure 3**. In addition, intersections along the corridor are spaced at approximately quarter mile intervals, the minimum recommended spacing for good signal progression along the corridor. This typical section was designed with higher speeds in mind, with a primary focus on the movement of traffic along the corridor. This typical section will continue to work well for Phase 2 in the areas outside the neighborhood centers.

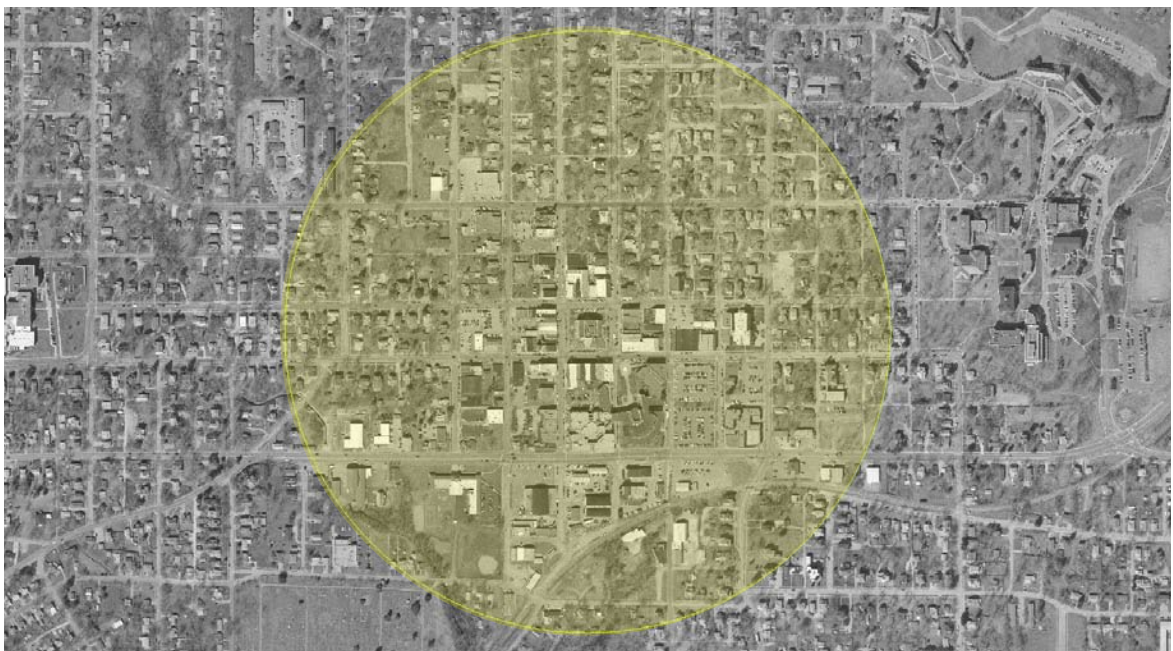


Figure 1: Quarter Mile Radius Walk From the Liberty Square

Within the neighborhood centers, the typical section for Phase 2 not only needs to be able to handle more traffic, but also provide for safe pedestrian activity as well. To accomplish this, a multiway boulevard section was developed (see **Figure 4**). In the multiway boulevard section, the center four lanes are used to carry the through traffic. The four lanes are narrower in width and separated by a tree lined median. Outside the center four lanes, a 20' wide tree lined parkway is developed. The combination of the narrow lanes with the trees in the center and outside medians create a tunnel effect intended to slow vehicular traffic. Intersections are spaced on 400-500 foot blocks, promoting slower speeds and the distribution of traffic throughout the neighborhood center.

Outside the parkway medians, one way access lanes would provide for local movement of traffic. These one way streets are low speed with on street parking, wide sidewalks, and with building faces at the back of walk, facing the parkway. These areas extending from the building faces out to the parkway medians are considered the pedestrian zone, where the design of the parkway is more pedestrian friendly.

Because Phase 2 of the parkway is likely to be constructed before substantial development takes

place along the corridor, it was necessary to develop a boulevard section that could be developed in stages. The first stage of its development would be the four center through lanes and medians (see **Figure 5**). These lanes could be constructed in advance of future development, providing a connection between Withers Road and M-291. Trees could be planted in the central and outside medians and allowed to begin maturing before development begins. Once development occurs, the one way access lane could be added and tailored to serve the proposed development. A more detailed discussion of the multiway boulevard can be found in HPE's report in **Appendix A**.

Alignment Analysis

Over the next few months following the charrette, HNTB analyzed the two alternatives based on topography, property impacts, and cost. A third alternative that tied directly into the existing Seven Hills Road/Old 210 intersection was briefly considered, but quickly ruled out due to the costs, difficult terrain, lack of adjacent developable land, and the poor intersection geometrics at the Seven Hills Road/Old 210 intersection.

HNTB used contour aerial mapping information provided by the City of Liberty and MJ Harden and Associates as base mapping for the analysis. The mapping is adequate for planning level studies. More detailed mapping will need to be obtained prior to final design. The result of the analysis of the North and South alignments, as well as a recommendation for the alignment of the second phase of South Liberty Parkway is below. The design criteria for the Parkway can be found in **Appendix B**.

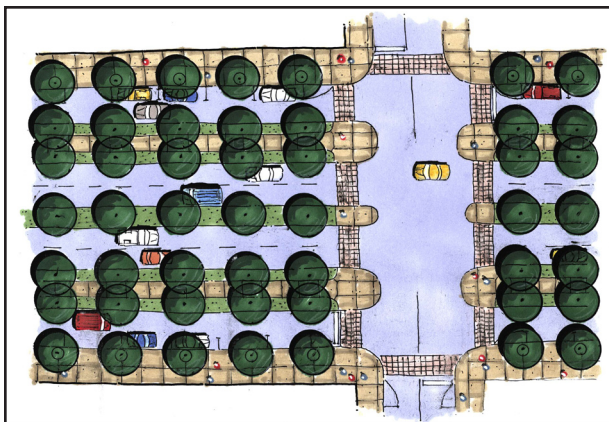


Figure 2: Conceptual Plan of the Multiway Boulevard Typical Section

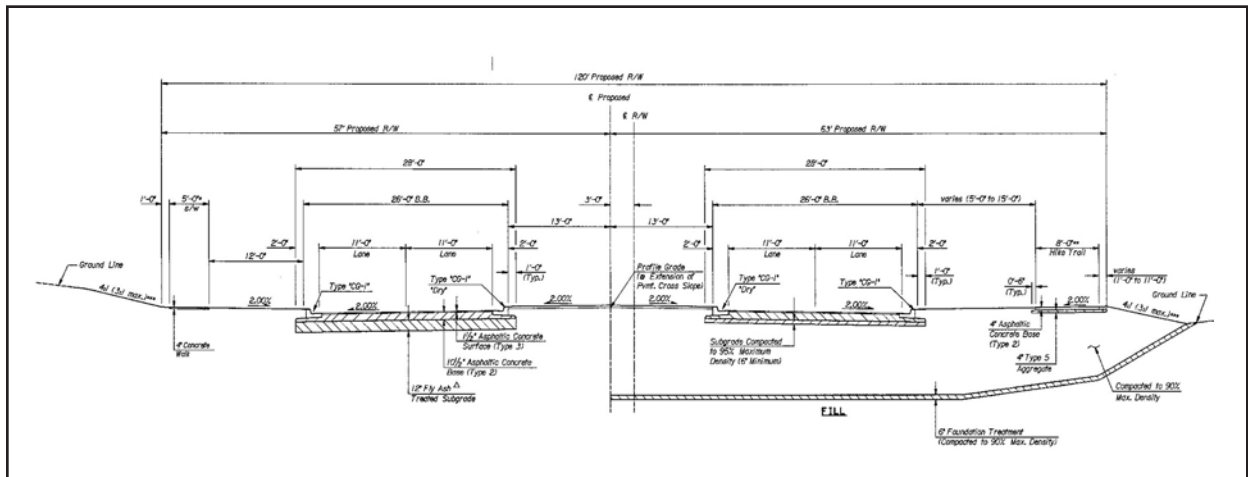


Figure 3: South Liberty Parkway - Phase 1 Typical Section

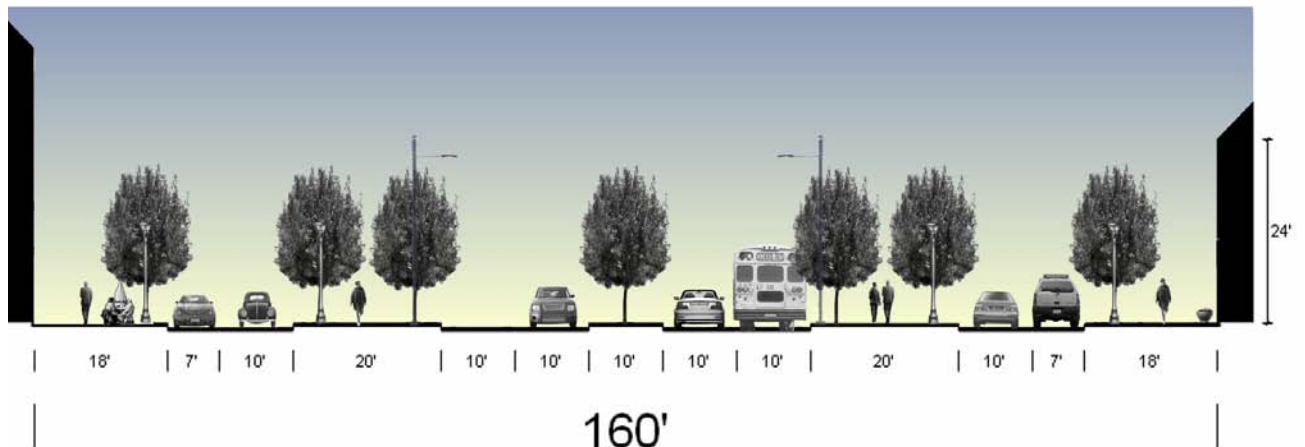


Figure 4: Multiway Boulevard Typical Section

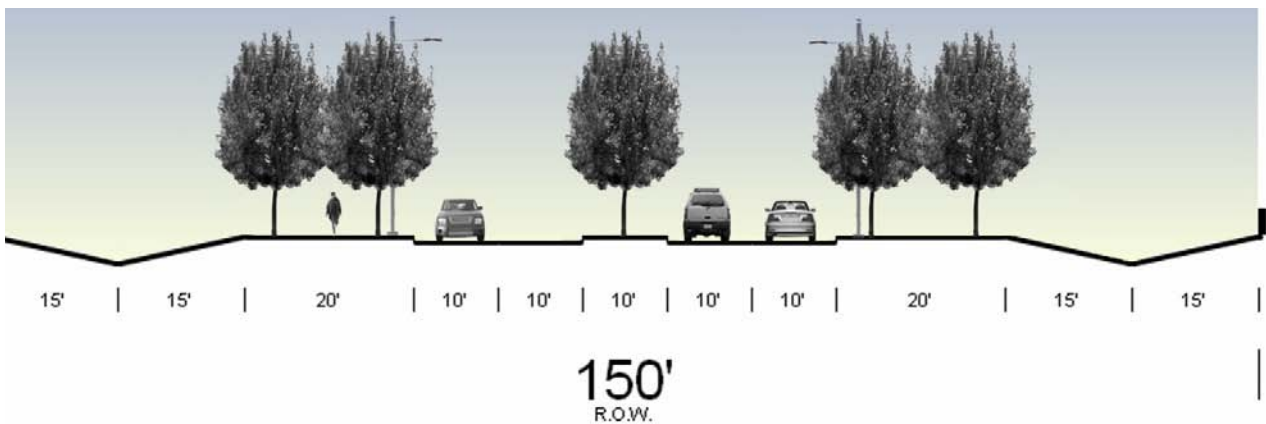


Figure 5: Stage 1 of the Multiway Boulevard Typical Section

The North Alignment

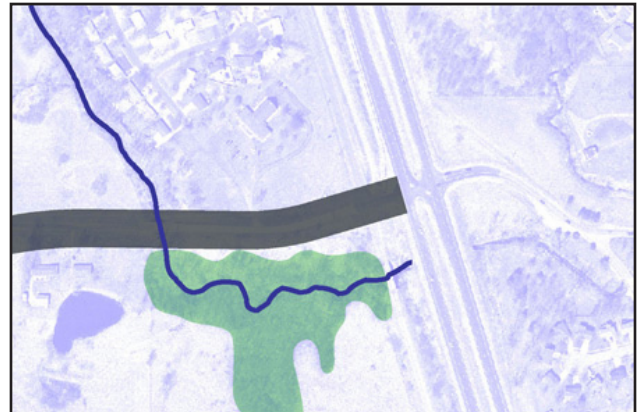
The North Alignment began at Withers Road and tied into M-291 at the existing Ruth Ewing intersection. This alignment conformed to the overall City Transportation Plan and had been the anticipated alignment before the design charrette took place. The North Alignment had the following advantages (Pros) and disadvantages (Cons):

Pros:

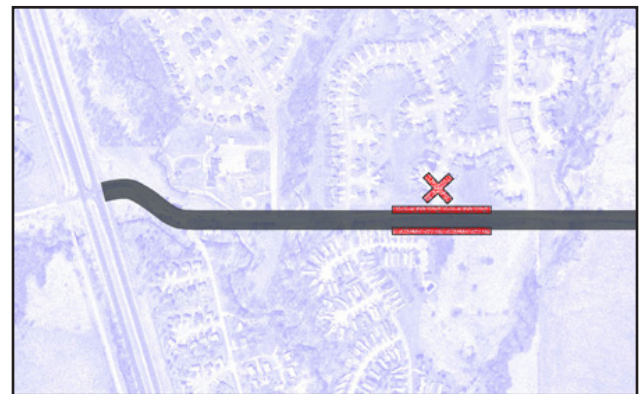
- Straight Alignment through Town Center provides for a better street grid/network.
- Better Adjacent topography for development.
- Existing Signal at Ruth Ewing and M-291 could remain in place, however, skewed intersection geometry is not ideal for major thoroughfare.
- No Break-in-Access along M-291 needed.

Cons:

- Less visibility from M-291 for future Property Reserve developments due to streamway vegetation.
- Not preferable intersection location/geometry at Ruth Ewing.
- Alignment not preferred by Property Reserve/Baptist Church.
- Impacts two homes on south side of Ruth Ewing west of M-291.
- Impacts underground utilities on Ruth Ewing Road (including gas transmission line).
- Due to existing development, outer roads connect too close to M-291 intersection.
- Mobile Home Acquisitions/20' Retaining Walls/Street Closures required to extend



Poor Intersection Geometry and Visibility



20' Retaining Walls & Street Closures

future parkway east of M-291.

- Several utility/power poles relocations east of M-291 on Ruth Ewing if parkway extended to east.
- Routing high volumes of traffic east of M-291 through residential area in future.

Construction Cost: \$12,182,000

The conceptual construction cost estimate for this alignment was \$12,182,000 based on building a four-lane median divided roadway section. A detailed cost breakdown is shown in **Table 2**.

The South Alignment

The South Alignment began at Withers Road and tied into M-291 approximately 3,800 feet south of Ruth Ewing Road. With this alignment, a new intersection is created with M-291 and the existing intersection at Old 210 Highway was recommended to be closed. The South Alignment had the following advantages (Pros) and disadvantages (Cons).

Pros:

- Preferred by Property Reserve and property owners on Ruth Ewing.
- Provides an additional access point on M-291 at the time of construction.
- Future alignment east of M-291 passes through undeveloped property.
- Avoids utilities on Ruth Ewing Road.
- Better separation can be gained from M-291 intersection and Outer Road connections.
- Could eliminate an unsafe intersection at Seven Hills Road.
- Passes through center of Property Reserve property, allows for single owner to develop both sides of roadway.

Cons:

- More curved through Town Center, hard to develop grided street network.
- Break-in-Access needed.
- Additional cost for interim connection to Sports Complex.
- Property/business impacts east of M-291 in future.
- Additional signal on M-291.

Construction Cost: \$13,633,000

The conceptual construction cost estimate for this



Interim Improvements Necessary to Serve Sports Complex

alignment was \$13,633,000 based on building a four-lane divided roadway from the end of Phase 1 (Withers Road) to a new intersection at M-291. It would also include extending the Parkway east of M-291 approximately 700 feet to Liberty Landing Road. It also includes upgrading the shoulders and overlaying Liberty Landing Road from South Liberty Parkway to Old 210, approximately 3,200 feet. This will provide safer access to the sports complex and the businesses along Old 210 once the M-291 and Old 210 intersection is closed. A detailed cost breakdown is shown in **Table 3**.

The Recommended Alignment

Based on the pros and cons stated above, HNTB recommends the southern alignment be the preferred alignment of South Liberty Parkway. The South Alignment satisfies most of the adjoining property owners' concerns, as well as provides a new connection to M-291 that is more conducive to expansion to the east. It will eliminate the dangerous intersection at Seven Hills Road/Old 210 and M-291 and will not impact the recently installed traffic signal at Ruth Ewing. HNTB feels these benefits offset the slightly higher construction cost of the South Alignment. More detailed plan and profile plates can be found in **Appendix C**.

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purposes such as government buildings, schools, libraries, hospitals, post offices, museums, etc.

- **Gateways:** major entry points into Liberty; development occurring within these areas should be high quality.

Based upon conversations with the city staff, it is our understanding that the Future Land Use Map was created to allow for a variety of different end uses. Determining the appropriate use requires a look at the market potential and the city's development preferences as expressed through the comprehensive plan goals and policies.

Market Analysis

Economics Research Associates prepared a Regional Economic and Market Analysis and Demand Forecasts for the South Liberty Corridor, both attached as appendices to this report. The reports first look at existing conditions and projections for Liberty, and then at market supply trends. In the Demographics and Economic Overview, ERA analyzed projections for Liberty, Clay County and the Kansas City MSA. Based upon the information they found, ERA projected a 33.4% population increase for Liberty for 2000 – 2010. ERA found that there is a concentration of people in younger age groups in Liberty, which they predict will lead to “demand for recreation/entertainment uses and the starter home market.” Household income and household growth have seen significant increases in the past ten years, which ERA predicts will result in demand for retail space in the region.

How much space is detailed in the Commercial Real Estate Market Supply Trends section of the report. ERA cites Cohen-Esry's Real Estate Service and Colliers Turley Martin Tucker to determine that

absorption of retail space was significant regionally in 2000 to 2001 (3.7 million square feet and a projected 3.3 million square feet respectively), with big box retail providing an enormous infusion of this square footage. Similar analysis is provided for the office market, where absorption has been weak over the past three years, attributable in part to the construction of the Sprint Campus in Overland Park, Kansas. Additionally, Colliers Turley reports that construction of the Farmland Industries campus caused a “major shock” in the northland sub-market, which will likely keep vacancy rates high. Finally, the industrial market has also slowed down, with class A warehouse/distribution space absorption falling short of construction.

ERA's Market Analysis is summarized in the Demand Forecasts memorandum, which states that “the proposed roadway will help spur development in a relatively undeveloped part of the region. It has the potential to fundamentally change the market perception of Liberty and to significantly increase the proportion of metropolitan growth captured in the I-35 corridor and in Clay County.” To that end, ERA projects the following high and low space demands for the South Liberty Parkway:

In (000s) Square Feet	2000-2020	Annual
Office Space Demand		
Low	236.1	11.8
High	331.6	16.6
Industrial Space Demand		
Low	147.8	7.4
High	384.3	19.2
Retail Space Demand		
Low	822.5	41.1
High	826.1	41.3

Table 4: Space Demands for South Liberty Parkway Corridor

As shown in the chart, ERA projects that retail use will play a predominate role in development along the Parkway. Forecasts were made based on current

and projected employment trends, using county-level employment data and a fair-share analysis to first predict demand in Liberty and then attribute a portion of the demand to the South Liberty Parkway. Retail space demand was calculated separately based on potential retail expenditures and supportable space needs.

Based on corridor projections, ERA believes that over the next twenty years, the South Liberty Parkway “might expect to see three-to-five high quality office buildings, one-to-two significant industrial developments, and one-to-two shopping centers.” They believe that this is consistent with other key connector roadways in the region.

Policy and Preference

While the market analysis provides information about trends and projections, the City has indicated a strong interest in providing more than just market guidance for this area. The Blueprint identifies a number of Key Recommendations relevant to land use decisions along the South Liberty Parkway. These include:

1. Maintain the Historic Liberty Square as the central core and community gathering space for Liberty while establishing smaller neighborhood focal points throughout the City.
2. Provide opportunities for commuter rail and other forms of public transportation in Liberty.
3. Promote the redevelopment of the Liberty Triangle.
4. Establish a variety of land uses along the South Liberty Parkway corridor

The community has invested a tremendous amount of resources in planning and designing the future transportation route. The South Liberty Parkway will have a significant impact not only on Liberty’s transportation system, but on future growth. The large Mixed Use area provides the opportunity to support higher densities, capitalize on the amount of traffic using the road, and provide a community focal point for the southern part of the city. The Business use area provides the opportunity to take advantage of good highway access and generate employment areas supporting neighborhoods to the south. The variety of land uses shown in this area take advantage of the regional benefits of connecting M-291 Highway and Interstate 35. New neighborhoods in this area should incorporate the Liberty Neighborhood Principles described herein.

In the past, Liberty has seen major roadways become barriers dividing the city and sources of congestion due, in part, to commercial strip development. To balance the competing goals of moving traffic and serving the needs of businesses and residents, the commercial land uses on the South Liberty Parkway are consolidated into a large Mixed Use node shown on the Future Land Use Map. This allows traffic to travel along the rest of the roadway with traffic slowing only at one point. The roadway should be designed to meet these multiple purposes.

5. Encourage mixed-use development in core areas of new neighborhoods.
6. Increase the diversity of parks and open spaces.
7. Provide ample opportunities for economic development and employment in Liberty; and
8. Gateways to Liberty should be designated to create a sense of arrival and distinguish Liberty from other communities.

In addition, the City has identified four areas of concentration that are important to implementing the vision for Liberty:

1. Create and reinforce a sense of community.
2. Improve green space and rural development.
3. Ensure a variety of housing opportunities.
4. Diversify available transportation options.

Read separately and together, these policies and implementation strategies provide more detailed instructions about development within the South Liberty Parkway corridor; however because this is a plan, there are still questions and concerns about the impact of the market on the ultimate build-out of this area.

Land Use Charrette

Based upon comments received from the public, the City Council directed City staff and the consultant team to review the Blueprint land use recommendations within the context of the new SLP alignment and updated market analysis. Based upon this review, City staff and the consultant team solicited public input to determine what changes to the Blueprint land use were appropriate based upon the new information provided by the study. On April 18th, 2005 City staff and the consultant team hosted a three-hour public charrette to solicit input on a preferred land use plan for areas adjacent to South Liberty Parkway from I-35 to M-291 Highway. Meeting participants included a cross-section of property owners, developers, business owners, residents and concerned citizens. As a result of this meeting, four different land use plans were developed and presented. After the meeting, the consultant team, with the assistance of City staff, combined common elements within each of the plans into a single “Consensus Plan”. The next section outlines the major changes from the original Blueprint to the Consensus Land Use Plan.

South Liberty Future Land Use Plan

The South Liberty Consensus Land Use Plan (see **Exhibit 3**), represents the community’s desire to promote compatible and beneficial growth. Community leaders and the public recognize the importance of economic development in providing amenities and jobs for residents as well as a solid tax base for services and infrastructure. The land use plan will be used by developers, property owners, business owners, residents, public officials and city staff as a framework for future development decisions.

These plan elements are represented on a map

by color designations. These designations do not represent elements of zoning or even a set of desired future land uses. Rather, the Land Use Plan represents a guideline for future development.

Phase I (West of Withers Road)

This area includes properties within Phase 1 of South Liberty Parkway stretching from I-35 to the floodplain area east of Withers Road.

Major changes from Blueprint:

- The area just east of South Liberty Parkway and I-35 is identified as Regional Commercial and Mixed-Use. This entire area was previously shown as Regional Commercial in Blueprint.
- The area along South Liberty Parkway, east of the regional commercial is identified as a mix of Neighborhood Commercial and Business Park/Office. This is a change from the original designation as Business Park in Blueprint.
- The area between the floodplain south of the Village of Glenaire and the north frontage road paralleling South Liberty Parkway is identified as Mixed Use. This area was shown previously as Civic/Institutional in Blueprint.
- The area north and west of Withers is identified as an area for Conventional Residential. This area was shown previously as Residential Neighborhood and Mixed Use.

Phase II (East of Withers Road)

This area includes properties within Phase 2 of South Liberty Parkway stretching from the floodplain east of Withers Road to just east of M-291.

Major changes from the Blueprint:

- An area just east of the floodplain and west of the railroad tracks is identified as Business Park/Office. This is a change from the original designation as Conservation in Blueprint.
- The Blueprint has already been amended to change a portion of the area north of Ruth Ewing Road to Conventional Residential. This Conventional Residential area is expanded in the Consensus Plan to include adjacent areas west of Old Birmingham Road. This expansion does not include the areas north of Ruth Ewing between the floodplain and M-291. These areas are shown to remain as Neighborhood Residential.
- The area along South Liberty Parkway between New Birmingham Road and M-291 is identified as Neighborhood Commercial. This is a change from the original designation of Residential Neighborhood in Blueprint. The Neighborhood Commercial area should expand to the east side of M-291 with the extension of South Liberty Parkway.
- A park is identified south of the area where New Birmingham terminates into M-291. This park was identified as an opportunity to preserve and enhance

the area surrounding the historic arsenal.

- Much of the area along the bluff between Old Birmingham Road and M-291 in the southern portion of the study areas is identified as Conservation Residential. This is a change from the original designation as Conservation in Blueprint. The area along the bluffs west of Old Birmingham Road is shown to remain Conservation.

Future Land Use Descriptions

There are several development styles that are envisioned along the SLP Corridor. A brief description of these different land uses has been outlined below:

- **Regional Commercial** - This style of development is often referred to as highway commercial and is typically comprised of large box retail establishments in a larger shopping center complex. The areas along M-152 Hwy and M-291 Hwy are considered regional commercial centers in that they serve a wider customer base.
- **Neighborhood Commercial** - This development pattern is more common for areas that are adjacent to, and connected with, residential areas. The objective is to allow and encourage retail customers to travel to these areas by vehicle, bike or foot. Neighborhood commercial centers would not allow large box establishments and the outdoor display of merchandise would be restricted.
- **Mixed-Use** - A combination of retail, office and residential uses are permitted in this type of development. The area around the Liberty Square typifies a mixed-use development, which is pedestrian oriented. In addition to encouraging ground floor retail with second story office or residential, mixed-use areas also require greater attention to architecture and design. Single-family attached townhouses are encouraged and apartments are permitted.
- **Business Park** - This type of development is envisioned to incorporate office complexes with some light industrial facilities. Such developments typically are designed in a comprehensive and coordinated manner and serve as an employment base for the community. Corporate Woods is an example of a business park. Light, or clean industrial sites are common in Liberty, typified by the Liberty industrial Park and Heartland Meadows. Such areas are different from a Business Park in that the emphasis is on manufacturing uses rather than professional offices.
- **Residential – Conventional** - This standard single-family residential development pattern has been used extensively, if not exclusively, to develop single-family neighborhoods in Liberty the past 30+ years. This style of development is comprised of lots that are, at a minimum, 70 feet wide by 110 feet deep that are a minimum 8,000 square feet in area. Such developments are very common throughout the metropolitan area. The style of housing

that is built in these areas does not often include much variety in pattern, form or price range.

- **Residential – Neighborhood** - This type of single-family development is similar to the conventional pattern with some exceptions. Often referred to as traditional, the neighborhood form of development has reduced minimums for lot width (50 feet), depth (90 feet) and area (5,000 square feet) to allow for higher densities and greater lot variety. In addition, the building setbacks are less than the conventional style and have been designed to specifically draw the home out closer to the street while requiring the garage to be setback from the front of the house.
- **Residential – Conservation** - This single-family development pattern is unique in that it requires the preservation of 50% of the development site as open space. The remaining balance of the property can develop at a density of two units per acre. These developments have a rural character, with significant natural areas and roads that can be built at a narrower standard and without curbs and gutters.

used as a resource for residents, land owners and project applicants concerning land planning and community development objectives. Additionally, City staff and public officials should use this document to guide future Capital Improvement Plan (CIP) considerations in the area. The Plan should be reviewed annually and revised as specific actions are achieved and new strategies are identified. Goals and objectives should also be reviewed periodically when new circumstances or changing conditions warrant reconsideration.

Plan Use

The South Liberty Land Use Plan will serve as a guide for future development along the South Liberty Corridor and surrounding area. The Land Use Plan should be consulted by City staff, the Planning Commission and the City Council when considering development proposals and updating land use regulations. The Land Use Plan should be

5.0 Traffic Analysis

The City of Liberty is experiencing unprecedented growth. To serve existing and future growth, transportation enhancements are needed. One of the primary roadway enhancements, South Liberty Parkway, has been identified as an important east/west corridor since the 1980's. In conjunction with the current planning and design for South Liberty Parkway and other planned roadways in the southern portion of the City, the City of Liberty recognized the need for improved tools to evaluate future travel in the City. As a result, a travel demand model was developed for the City of Liberty.

This Transportation Summary Report provides a description of the study methodology and a summary of the transportation analysis from the City's new travel demand model and results from the more detailed traffic analysis of South Liberty Parkway. This report is not a comprehensive thoroughfare study.

The primary goal of the study was to develop a planning process which would analyze existing and proposed roadways in the City including the South Liberty Parkway. A travel demand model was created in 2002 to provide future travel characteristics of primary roadway facilities based on forecasted land use. This is not a one time use tool. This is a tool that the City can continue to use in the future. Before development of the model, the City was not able to accurately forecast traffic. The travel demand model provides a macro-level transportation planning tool. A simulation model was created to analyze traffic operation characteristics at a micro-level for the South Liberty Parkway corridor.

The Travel Demand Model Technical Report is a separate report that provides documentation on the development of Liberty's PM peak hour travel

demand model. This report provides documentation of the model development for future use.

The travel demand model Study Area represents travel conditions that extend beyond Liberty's municipal boundary. This is to account for regional transportation facilities and the future growth of Liberty. **Exhibit 5: Liberty Travel Demand Model Area** shows the travel demand model Study Area.

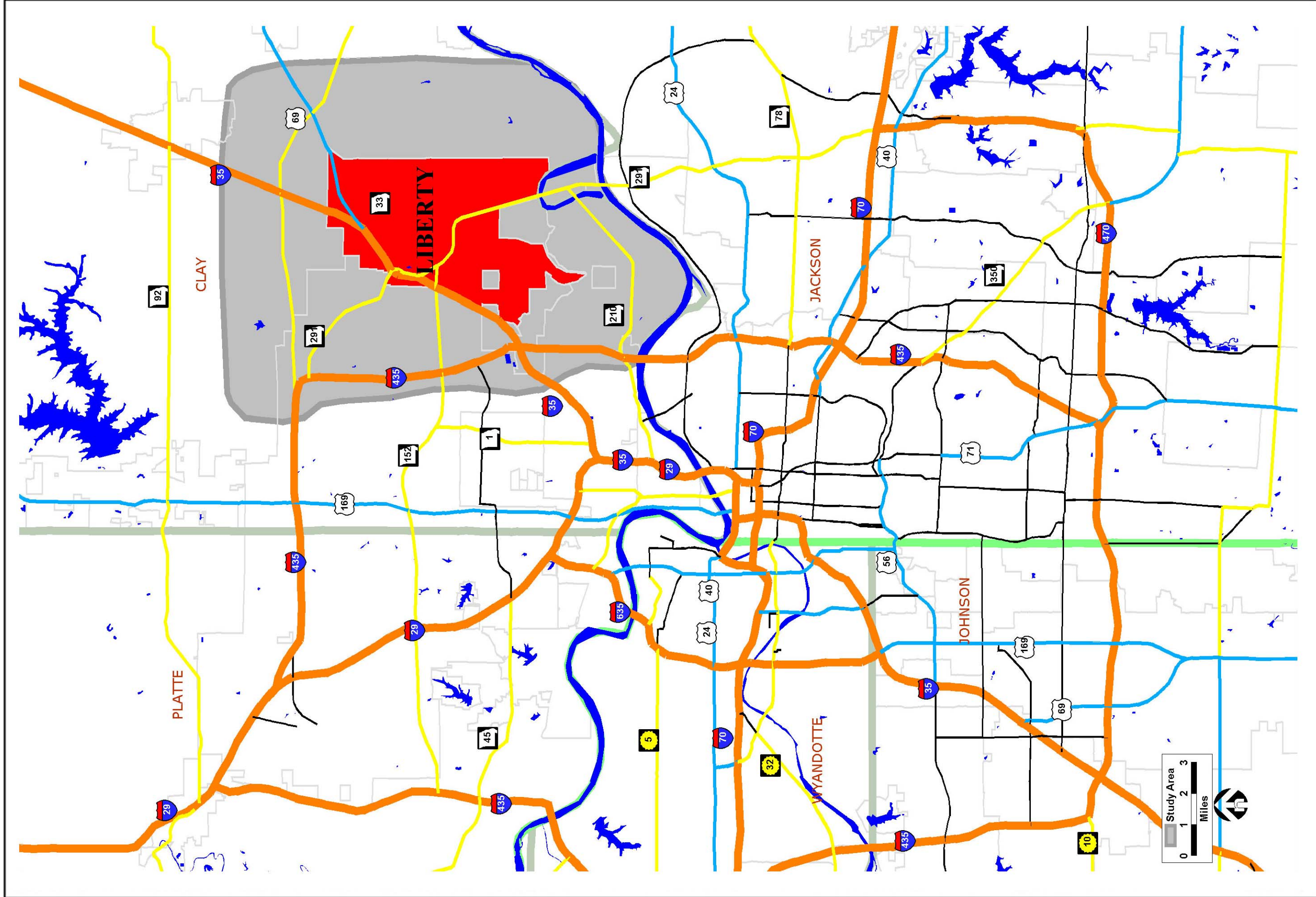
The study was performed in two phases.

- Phase 1 developed the Liberty Travel Demand Model, Future 2025 traffic forecasts and operational analysis of South Liberty Parkway with the focus on South Liberty Parkway from I-35 to Withers Road. This study was completed in 2003.
- Phase 2 refined future land use along South Liberty Parkway, revised future 2025 traffic forecasts and performed operational analysis of South Liberty Parkway with the focus on South Liberty Parkway from Withers Road to M-291. This study was completed in 2006.

Phase I Study Methodology (I-35 to Withers Road)

Travel Demand Model

TransCAD was used to develop a PM peak hour travel demand model for the City of Liberty. TransCAD combines the advantages of a geographic information system (GIS) with travel demand modeling. By using TransCAD, model development, accuracy and speed were greatly enhanced.



Existing and future land use data for the Study Area were developed by City staff from Clay County tax assessor data at the parcel level. Existing land use represents the year 2001. Existing land use was used to generate traffic and compare travel characteristics with existing traffic counts, supplied by the City. Once the travel demand model was validated to replicate 2001 travel in the Liberty model Study Area, future land use assumptions replaced existing land use assumptions in the model. Future land use was developed to replicate 2010 and 2025 design years. A detailed description of model development is described in the Travel Demand Model Technical Report section of this report.

Alternatives Analyzed

Alternatives analyzed represent land use and roadway network combinations. Table 5 identifies the alternatives analyzed using the travel demand model. Three base model runs and four “what if” scenarios were analyzed. Base year alternatives represent committed and planned projects anticipated in the analysis year. Table 6 provides

a listing of committed and planned projects assumed.

Base Model Alternatives

- **Base 1 (B1)** – The calibrated model. It contains existing land use and existing roadway network.
- **Base 2 (B2)** – The 2010 base condition. It contains 2010 land use and 2010 committed and planned projects. Roadway projects eliminated from the base for analysis purposes are South Liberty Parkway from Withers Road to M-291 and Flintlock from 76th Street to Liberty Drive.
- **Base 3 (B3)** – The 2025 base condition. It contains 2025 land use and 2025 committed and planned projects. Projects eliminated from the base for analysis purposes are the I-435 extension and the eastern bypass.

Land Use	Roadway Network				
	Base	“What If” Scenarios			
	Existing Roadway Network	Construct S. Liberty from Withers to M-291	Construct Flintlock from 76 th to S. Liberty and Relocate US 69	Construct Both S1 and S2	Eliminate I-435 Extension and the Eastern Bypass
Existing (2001)	B1 ^a				
2010	B2 ^b	S1 ^b	S2 ^b	S3 ^b	
2025	B3 ^b				S4 ^b

a. Calibrated model of existing conditions.
b. Includes committed and planned projects identified in Tables 2.2.
More detailed traffic operational analysis was performed for Alternatives that are in red.

Table 5: Travel Demand Model Alternatives (PM Peak Hour)

ID	Year	Road	To/From	Improvement	Source
Committed Projects					
1	2010	Flintlock Road	76 th St. to Liberty Drive	New Overpass	Liberty Staff
2	2010	M-152	M-291 to I-35	Widen to 6 Lanes	Liberty Staff
3	2010	South Liberty Pkwy.	I-35 to Withers Road	New 4 Lane Facility	Liberty Staff
4	2025	Parvin Road	I-435 to Hughes Road	Widen to 4 Lanes	Liberty Staff
5	2010	M-291 Interchange	I-35 Interchange	Ramps to Glen Hedren	Liberty Staff
6	2010	US 69/M-33/I-35	Intersection	Add. Lanes	Liberty Staff

Planned Projects					
20	2010	South Liberty Pkwy.	Withers Road to M-291	New 4 Lane Facility	MARC
21	2025	N.E. 96 th St.	Shoal Cr Pkwy to Reinking Rd.	New 4 Lane Facility	MARC
22	2010	Shoal Creek Parkway	I-435 to Barry Road	New 4 Lane Facility	MARC
23	2010	Shoal Creek Parkway	Barry Road to 96 th St.	New 4 Lane Facility	MARC
24	2025	Pleasant Valley Road	I-35 Interchange	Interchange Modifications	MARC
25	2025	M-152 Interchange	I-35 Interchange	Interchange Modifications	MARC
26	2025	M-33	US 69 to Collector A	Widen to 4 Lanes	MARC
27	2025	Route B	Route H to US 69	Improved 2 Lanes	MARC
28	2025	Route H	Route B to Mill Street	Improved 2 Lanes	MARC
29	2025	I-435 Extension	I-435 to I-35	New 4 Lane Facility	MARC
30	2025	I-35	Study Area	Widen to 6 Lanes	MARC/Ass.
31	2025	N.E. 108 th St.	I-435 to Reinking Rd.	New 4 Lane Facility	MARC
32	2025	Eastern Bypass	M-210 to US 69	New 4 Lane Facility	City Plan
33	2010	Claywoods Parkway	Connect Existing Segments	New 2 Lane Facility	City Plan
34	2025	Hughes Road	South Liberty to M-210	New 2 Lane Facility	KC,MO
35	2025	N.E. 48 th St.	I-435 to Hughes Rd.	New 2 Lane Facility	KC,MO
36	2010	M-210	M-210 Development District	Widen to 4 Lanes	MARC
37	2025	Shepherd Road	Lightburne to Eastern Bypass	New 2 Lane Facility	City Plan
38	2010	Collector B	Glen Hedren to Lightburne	New 2 Lane Facility	City Plan
39	2025	Collector C	Plattsburg to Route A	New 2 Lane Facility	City Plan
40	2025	Withers Road	South Liberty to Hughes Rd	New 4 Lane Facility	City Plan
41	2010	Collector A	Withers Rd to Birmingham	New 2 Lane Facility	City Plan
42	2025	LaFrenz Rd.	Ruth Ewing Rd. to M-210	New 2 Lane Facility	City Plan
43	2025	Ruth Ewing Rd.	M-291 to Eastern Bypass	New 2 Lane Facility	City Plan
44	2010	N.E. 76 th St.	I-435 to Flintlock	Widen to 4 Lanes	KC,MO
45	2025	N.E. 96 th St.	Shoal Creek to M-291	Widen to 4 Lanes	KC,MO
46	2025	I-435	Route A	Interchange	Assumption
47	2025	Seven Hills Rd.	Birmingham to M-291	New 2 Lane Facility	Liberty Staff
48	2010	Buckingham Dr.	South Wales to Withers Rd.	New 2 Lane Facility	Liberty Staff
49	2010	MidJay Drive	Stewart to Liberty Dr.	New 2 Lane Facility	Liberty Staff
50	2010	Robertson Pkwy	M-291 to Claywoods Pkwy.	New 2 Lane Facility	Liberty Staff
51	2025	Flintlock Extension	South Liberty Pkwy. to US 69	New 4 Lane Facility	Liberty Staff

Source represents where the improvement originated: Liberty Staff – Identified committed projects in the next 5 to 10 years. MARC – 2030 Long-Range Transportation Plan. City Plan – Liberty Comprehensive Transportation Plan, July 2001. KC,MO – Major Street Plan. Only projects that directly serve 2025 land use demand were identified. Assumption – Additional assumptions not identified in any plans.

Table 6: Committed and Planned Projects

“What If Scenario” Alternatives

- **Scenario 1 (S1)** – The 2010 base condition (B2) plus construction of South Liberty Parkway from Withers to M-291.
- **Scenario 2 (S2)** – The 2010 base condition (B2) plus construction of Flintlock from 76th to Liberty Drive and relocation of US 69.
- **Scenario 3 (S3)** – The 2010 base condition (B2) plus construction of Alternatives S1 and S2.
- **Scenario 4 (S4)** – The 2025 base condition (B2) but eliminates I-435 extension and the eastern bypass.

Detailed traffic operational analysis was performed for Alternatives B2, B3 and S1 on South Liberty Parkway as described in the section entitled “**South Liberty Parkway Traffic Analysis (Micro-Level Analysis).**”

Street Network Evaluation (Macro-Level Analysis)

Measures of effectiveness (MOE's), generated from the travel demand model, were used to evaluate the general efficiency of the Liberty street network for each alternative analyzed.

System-wide MOE's are presented to compare total travel conditions between alternatives. The model Study Area and City of Liberty (minus I-35) transportation measures of effectiveness were evaluated. The performance measures identify travel efficiency.

- **Trips** – This measure identifies the number of vehicle trips generated by the model for each design year. The expected growth in traffic as a result of the expected land use can be calculated.
- **VMT** – Vehicle Miles Traveled is a measure that indicates travel efficiency and directness of travel. The measure of VMT is a summation of the miles traveled by all of the vehicles operating during the PM peak hour. Lower values of VMT are considered more desirable.
- **VHT** – Vehicle Hours Traveled is a measure that indicates travel efficiency and travel time. The measure of VHT is a summation of the travel time in hours for all vehicle trips during the PM peak hour. A lower number is considered desirable since it represents faster travel speeds and decreased travel delays.
- **Delay** – Vehicle delay is a measure that indicates travel inefficiency and network congestion. The measure of delay is a summation of the difference from the free-flow travel time and the congested travel time. Lower delay volumes are desirable.

Roadways were evaluated based on roadway supply and demand. Roadway supply or capacity is a theoretical value that represents the expected number of vehicles than can traverse the roadway segment during the peak hour. Roadway capacities were calculated based on NCHRP 365 standards, the functional class of the roadway and the number of travel lanes. **Table 7** shows the capacity of roadways within the model network based on

functional classification. Other transportation factors that influence when a roadway should be improved were not considered in this study. The primary measure used to evaluate the condition of the Liberty street network is traffic volume to capacity (V/C) ratio. Volume/capacity ratios were categorized into four groups described in **Table 8**.

Functional Classification	Roadway Capacity (vphpl) ^a
Freeway	2,200
Arterial (Non-Signalized)	1,400
Arterial (Signalized)	1,200
Collector	800
Rural Arterial	1,200
Rural Collector	500
Centroid Connector	10,000

^aVehicles per hour per lane (vphpl)

Table 7: Roadway Capacity

Based on the volume to capacity ratio of a roadway segment, a color is identified to represent thresholds ranging from “Under Capacity” to “Significantly Above Capacity”.

Roadway segments that have a V/C ratio “Under

Capacity” ($V/C < 0.79$) were considered to have no capacity problems. Roadway segments that have a V/C ratio “Near Capacity” (V/C 0.80 to 0.99) could potentially have roadway segment and intersection capacity problems. Roadway segments that had a V/C ratio “Above Capacity” ($V/C > 1.00$ to 1.19) were considered to have roadway segment and intersection capacity problems. Roadway segments that had a V/C ratio “Significantly Above Capacity” ($V/C > 1.20$) were considered to have significant roadway segment and intersection capacity problems.

South Liberty Parkway Traffic Analysis (Micro-Level Analysis)

More detailed traffic analysis was performed for the South Liberty Parkway. Synchro/SimTraffic was used to analyze the arterial corridor and intersections. The analysis provides quantitative and visual graphics of potential problem areas during the PM peak hour. Future traffic demand from the travel demand model was used with proposed roadway geometrics. Data output from the model represents travel characteristics of corridor operational conditions.

Capacity Condition	Volume to Capacity (V/C) Ratio	Roadway Color
Under Capacity	Roadway $V/C \leq 0.79$	Blue
Near Capacity	Roadway V/C 0.80 to 0.99	Green
Above Capacity	Roadway V/C 1.00 to 1.19	Yellow
Significantly Above Capacity	Roadway $V/C \geq 1.20$	Red

Table 8: Volume to Capacity (V/C) of Roadway Segments

¹National Cooperative Highway Research Program, Report 365, Travel Estimation Techniques for Urban Planning, Transportation Research Board, National Research Council, National Academy Press, Washington, D.C., 1998.

Alternative analyzed include:

- **Base 2 (B2)** – The 2010 base condition. It contains 2010 land use and 2010 committed and planned projects. Roadway projects eliminated from the base for analysis purposes are South Liberty Parkway from Withers Road to M-291 and Flintlock from 76th Street to Liberty Drive. B2 does include South Liberty Parkway from I-35 to Withers Road.
- **Base 3 (B3)** – The 2025 base condition. It contains 2025 land use and 2025 committed and planned projects. Projects eliminated from the base for analysis purposes are the I-435 extension and the eastern bypass. B3 does include South Liberty Parkway from I-35 to M-291.
- **Scenario 1 (S1)** – The 2010 base condition (B2) plus additional network

traffic volumes consistent with construction of South Liberty Parkway from I-35 to M-291

The South Liberty Parkway study corridor is shown in **Figure 6: South Liberty Parkway Corridor**.

Phase 2 South Liberty Parkway (Withers Road To M-291)

In Phase 2, the Liberty Travel Demand Model was used to develop traffic forecast volumes in the South Liberty Parkway study corridor. The travel model produces future PM peak hour forecasts for 2010 and 2025 (full build) design years. The Liberty travel demand model was originally developed in Phase 1 to analyze the South Liberty Parkway corridor with a focus on I-35 to Withers Road.

Since the completion of the Phase 1 South Liberty Parkway Study in 2003, further community planning has modified the land use vision along the corridor. In addition, modifications to the corridor

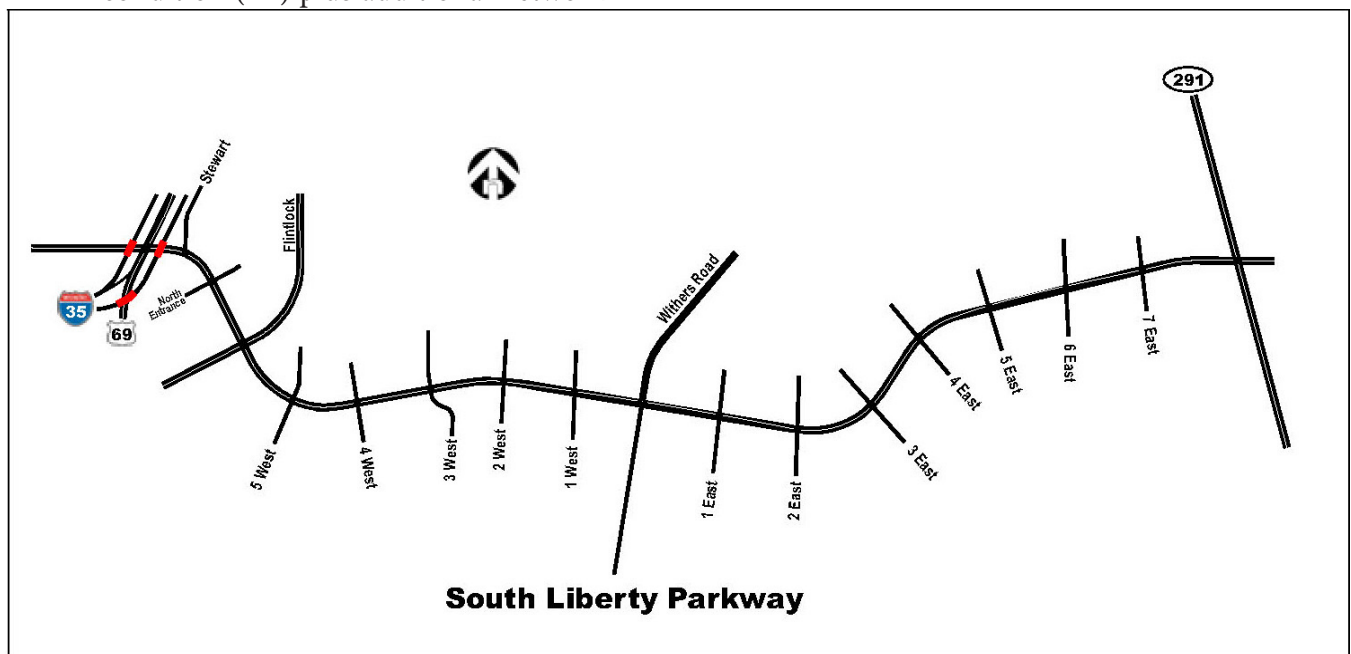


Figure 6: South Liberty Parkway Corridor

alignment east of Withers Road and the need for more detailed travel model output necessitated modifications to the travel model. Modifications were associated with land use, zone structure and the roadway network. **Exhibit 6** shows the modified travel model in the vicinity of South Liberty Parkway.

A Synchro traffic operations model was developed to analyze the multiway boulevard concept along South Liberty Parkway and Birmingham.

Travel Demand Model Results

Phase I Land Use Summation (I-35 To Withers Road)

Land use forecasts provided by the City staff were used as a primary input for producing traffic forecasts

from the Liberty travel demand model. Land use forecasts were provided for the three time periods 2001, 2010 and 2025. **Table 9** summarizes the land use assumptions used in the model. Detailed land use information by traffic analysis zone is shown in **Appendix F**. Areas defined as Study Area, City of Liberty and South Liberty Parkway (SLP) are shown in **Figure 2.3** in the Travel Demand Model Technical Report also located in **Appendix F**.

Table 9 shows steady growth in housing and employment between 2001 and 2010. However, significant growth is shown between 2010 and 2025. These land use assumptions have a direct relationship with the traffic demand forecasted. Based on the land use assumptions, total vehicle trips generated by traffic analysis zone are calculated. The total vehicle trips generated from the land use assumptions by study year is shown in **Table 10**.

Year	Study Area		City of Liberty		SLP Study Corridor	
	Households	Employment Area ^a	Households	Employment Area ^a	Households	Employment Area ^a
2001	16,880	7.1	10,160	3.9	190	0.1
2010	22,470	10.7	12,970	6.3	1,330	1.5
2025	56,830	21.7	29,250	17.4	2,607	2.7

^a Employment Area given in millions of square feet of gross floor space and does not include special generators identified in the Travel Demand Model Technical Report.

Table 9: Land Use Forecasts

Alternative	Year	Trips ^a
Base 1	2001	34,715
Base 2	2010	44,825
Base 3	2025	84,560
S1 - SLP Ext.	2010	44,825
S2 – Flintlock Ext.	2010	44,825
S3 – SLF & Flintlock Ext.	2010	44,825
S4 – No E. Bypass	2025	84,560

^a. Trips = Vehicle trips minus intrazonal trips.

Table 10: Vehicle Trips Generated PM Peak Hour



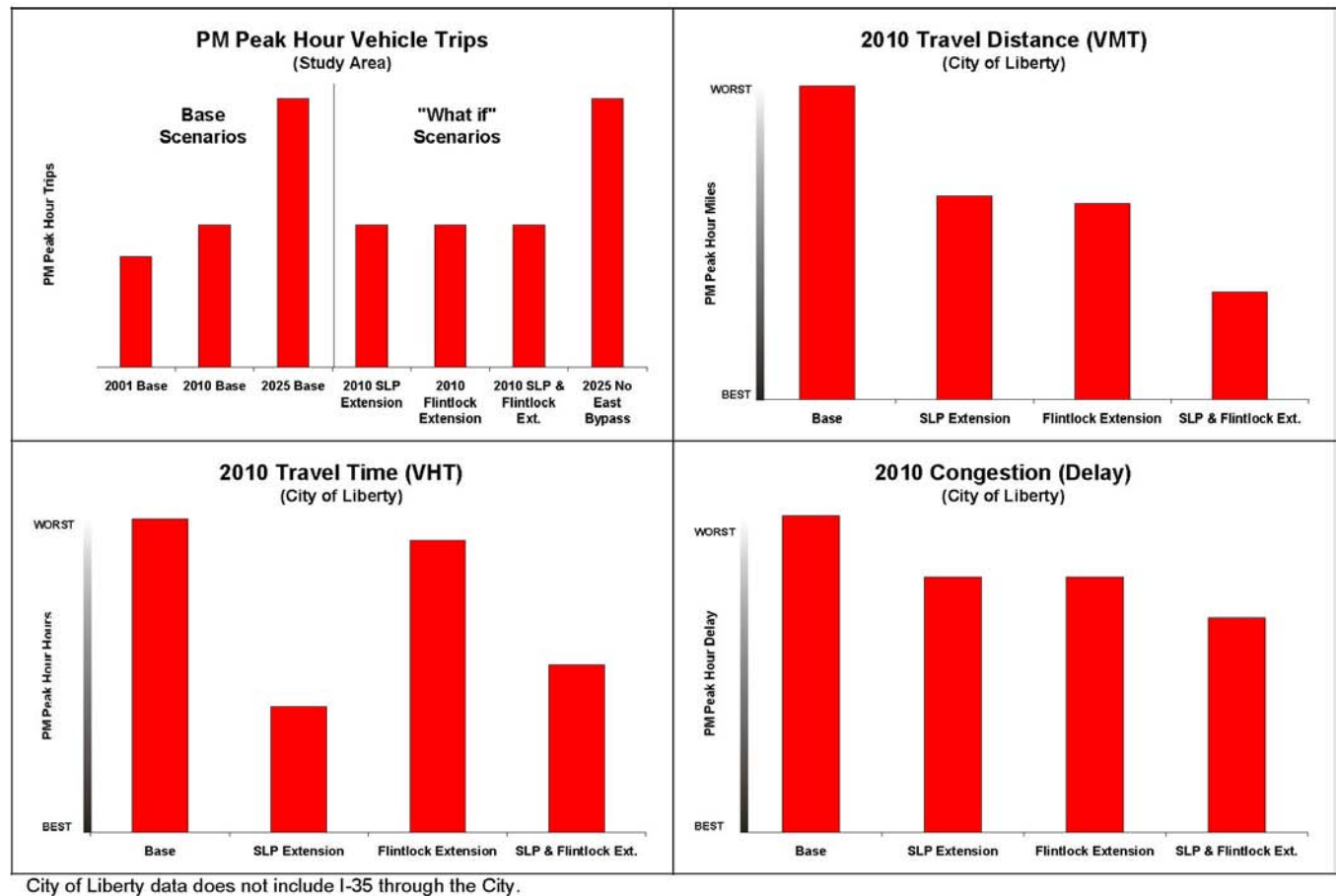


Figure 7: Liberty PM Peak Hour Performance Summary

Future Traffic Demand

One of the primary products from the Liberty travel demand model is future traffic demand based on future land use assumptions. **Table 11** provides a summary of existing and model forecasted traffic growth in key areas of the City. Traffic volumes for all alternatives are shown on exhibits in the section entitled “**Roadway Volume to Capacity (V/C)**.”

System-wide Measures Of Effectiveness

In addition to future PM peak hour traffic demand, the travel demand model generates performance

measures which characterize travel conditions. **Table 12 and Figure 7** summarize motorist performance measures for each alternative.

Based on the model performance measures, the results indicate that both the South Liberty Parkway extension from Withers Road to M-291 and the Flintlock Road extension from Liberty Drive to 76th Street are both projects that improve travel to Liberty motorists. Both projects, individually and together provide a benefit over the base, do nothing condition.

Although both projects provide benefits to Liberty

Location	2001 ^a (Count/Model)	2010 ^b	2025 ^c
M-152 east of I-35	3,439 / 3,940	4,428	7,446
M-291 north of M-152	1,505 / 1,665	3,254	4,442
M-291 north of Ruth Ewing Road	2,188 / 2,532	3,303	3,908
Mill Street east of Lightburne	1,399 / 1,336	1,652	3,293
Lightburne south of US 69	834 / 789	623	731
Route H east of Route B	191 / 224	434	1,248
South Liberty Drive/Parkway east of I-35	1,272 / 1,093	3,147	4,029
US 69 W. of Lightburne	2,578 / 2,274	3,241	6,080
Conistor S. of Stewart	638 / 732	968	1,136
Ruth Ewing E. of M-291	573 / 662	648	1,538
Route B S. of US 69	256 / 309	375	204
Richfield E. of LaFrenz	92 / 181	213	390
M-210 E. of M-291	753 / 691	1,080	3,027
Nashua W. of Clayview	529 / 559	529	743
I-35 N. of M-152	5,477 / 5,158	6,779	10,948

Source: Liberty Travel Demand Model

a 2001 count from available city data, model is the calibrated result at that location.

b 2010 Base Model, B2

c 2025 Base Model, B3

Table 11: 2-Way PM Peak Hour Traffic Volume Comparison at Select Locations

Alternative	Year	Travel Distance		Travel Time		Congestion	
		VMT ^a	Rank	VHT ^a	Rank	Delay ^a	Rank
Base 1	2001	47,610		1,182		9	
Base 2	2010	72,110	4	1,711	4	31	4
Base 3	2025	119,400		3,208		273	
S1 - SLP Ext.	2010	71,830	3	1,693	1	25	2
S2 – Flintlock Ext.	2010	71,810	2	1,709	3	25	2
S3 – SLF & Flintlock Ext.	2010	71,584	1	1,697	2	21	1
S4 – No East Bypass	2025	133,600		3,767		445	

a. VMT = Vehicle Miles Traveled, VHT = Vehicle Hours Traveled, Delay = Vehicle Hours of Delay on roadway links only.

Table 12: Liberty PM Peak Hour Travel Demand Model Performance Measures
(City of Liberty Minus I-35)

motorists, priority should be to build the extension of South Liberty Parkway before the Flintlock extension. The South Liberty Parkway extension should be built first because it has targeted benefits to Liberty residents, whereas the Flintlock improvement also provides benefits to areas outside of the City of Liberty.

Building the South Liberty Parkway extension from Withers to M-291 provides the lowest overall travel time for Liberty motorists. Constructing the South Liberty Parkway extension provides an alternative east/west route in Liberty to reduce traffic demand along the City's most heavily congested corridor, M-152. The South Liberty Parkway extension provides an economic development benefit to the City.

The Flintlock extension provides Liberty and Kansas City, Missouri with an alternative north/south route. Although this does lower traffic demand on local Liberty north/south routes, it provides little benefit to reducing travel time since the new, less congested route, creates some out of direction travel for its use. The Flintlock extension also does little to reduce travel in Liberty's M-152 corridor, and may even contribute to more travel within the corridor. Congestion on Liberty streets is reduced with the combination of both projects as both projects together provide a reduction in motorist delay.

Roadway Volume To Capacity (V/C)

The following section provides the results of the roadway link volume to capacity analysis. This represents a macro-level analysis of future demand compared to roadway capacity. **Exhibits 7 through 13** show model volumes and V/C ratios for each of the alternatives analyzed.

Volume To Capacity Problem Segments

Based on the future traffic demand and V/C ratio figures, V/C problem segments were identified. **Table 13** provides a list of segments where the V/C ratio is above the identified roadway capacity ($V/C > 1.0$). These segments represents areas of concern where more detailed analysis may be warranted.

Phase 2 (Withers Road To M-291)

Based on the Phase 2 land use and roadway network modifications to the travel model, new traffic forecasts were developed. **Exhibit 14** shows the forecasted 2025 PM peak hour turning volumes along the study corridor. Due to the lower travel speeds assumed along South Liberty Parkway in the vicinity of Birmingham Road, some motorists are diverted to Birmingham Road and then Ruth Ewing Road to access M-291. A comparison between Phase 1 and 2 traffic forecasts along South Liberty Parkway is provided in **Table 14**.

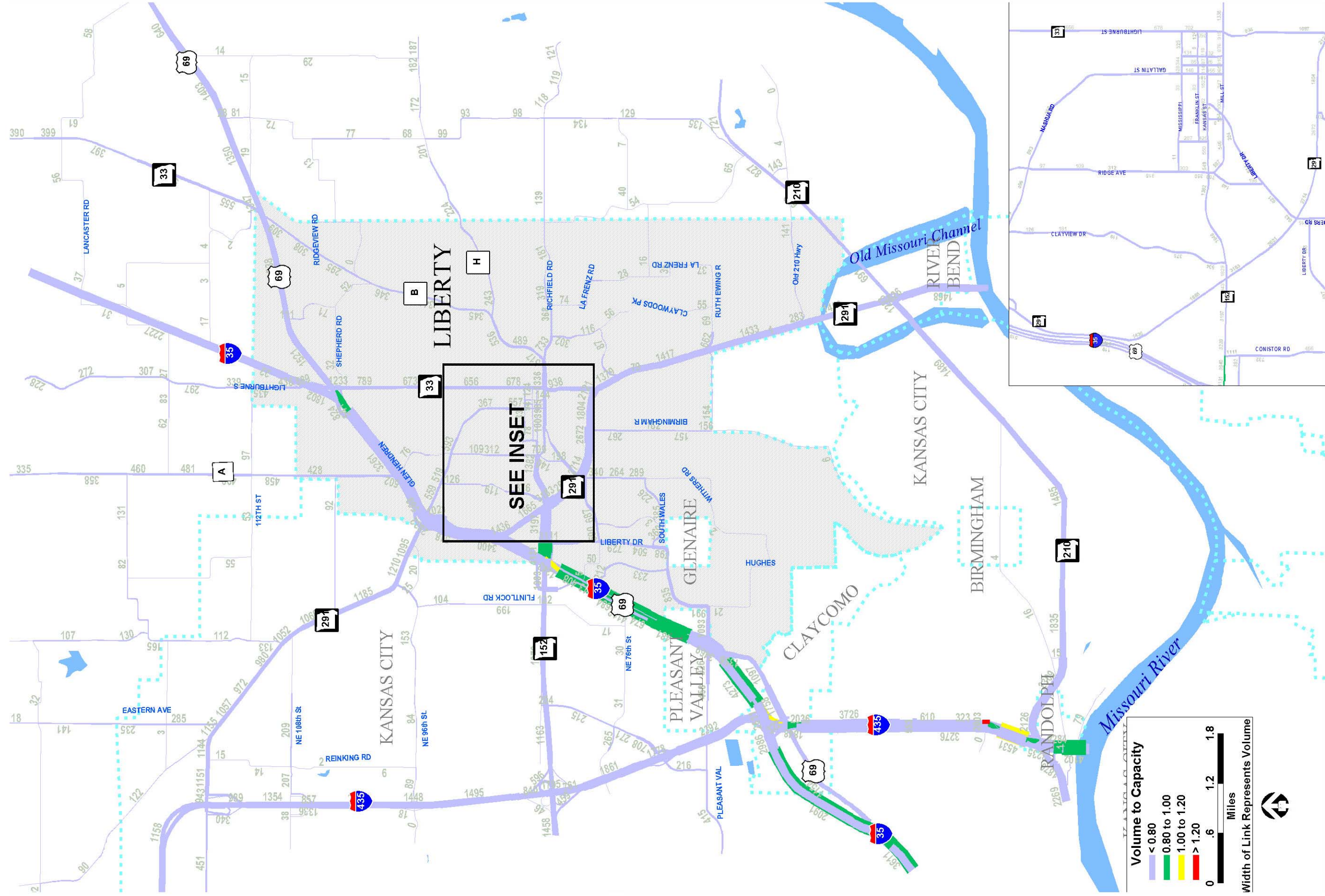
South Liberty Parkway Results

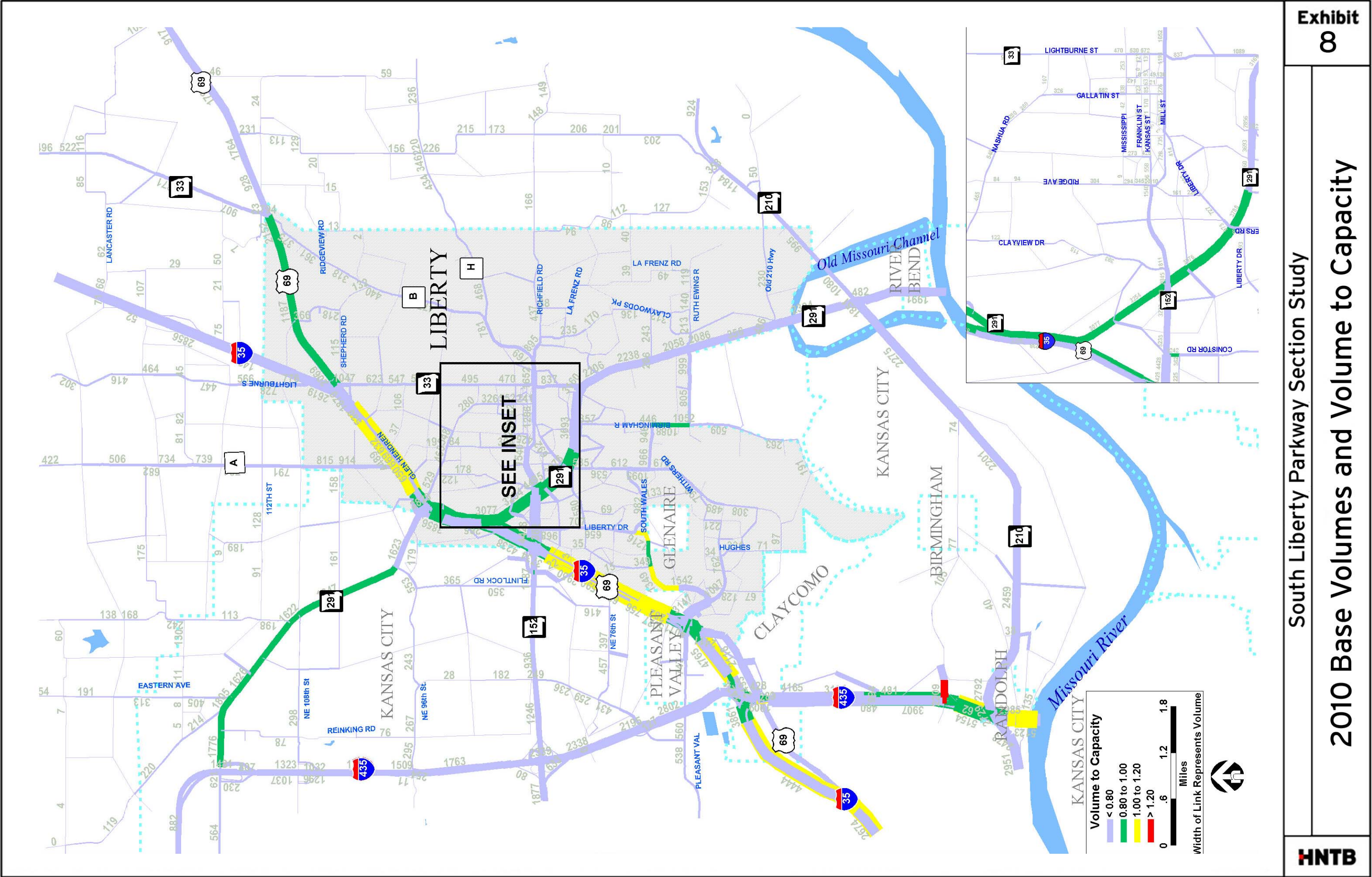
Detailed traffic analysis for South Liberty Parkway focused on three alternatives described in the section entitled "**South Liberty Parkway Traffic Analysis (Micro-Level Analysis)**."

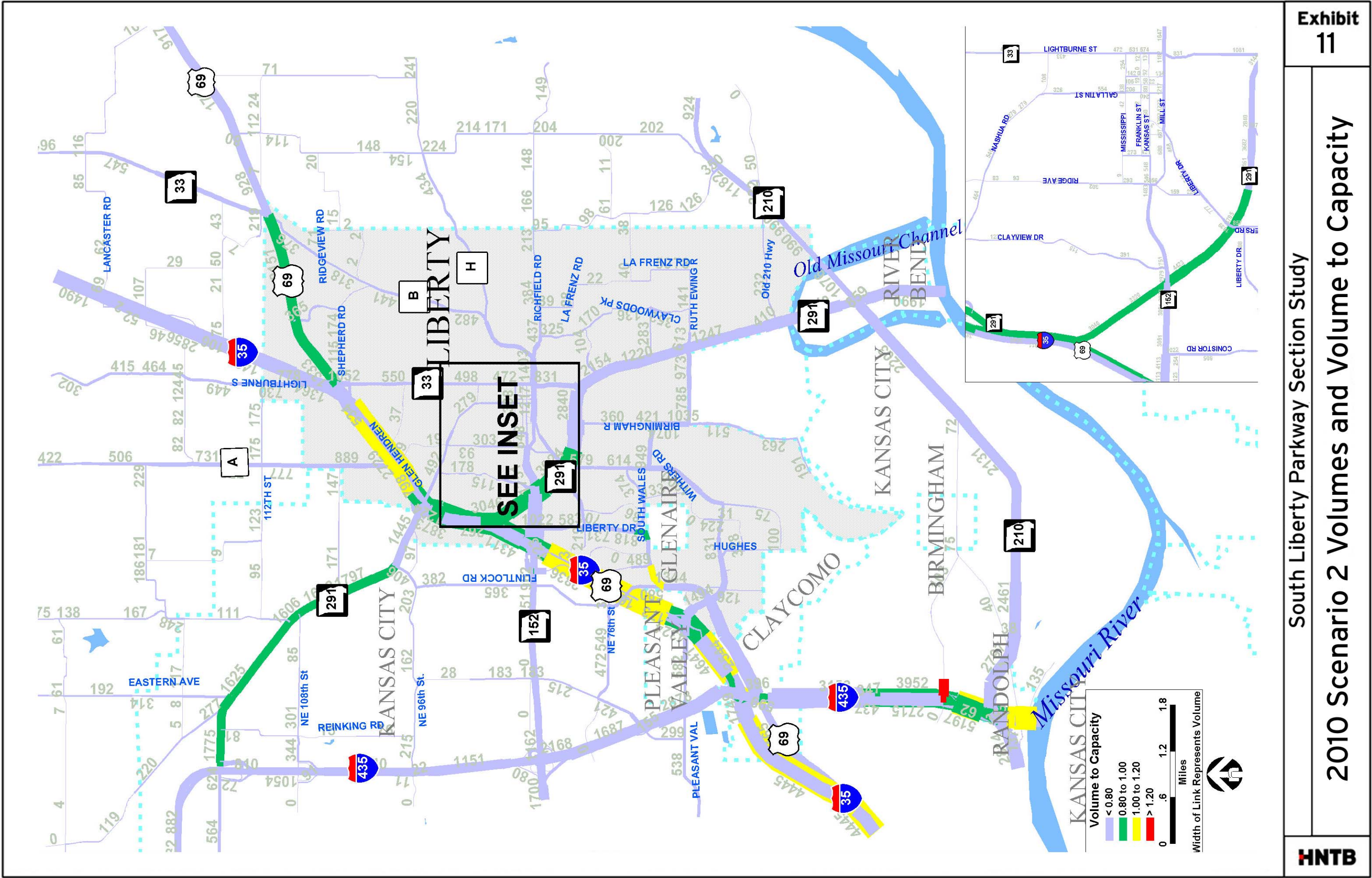
Phase 1 (I-35 To Withers Road)

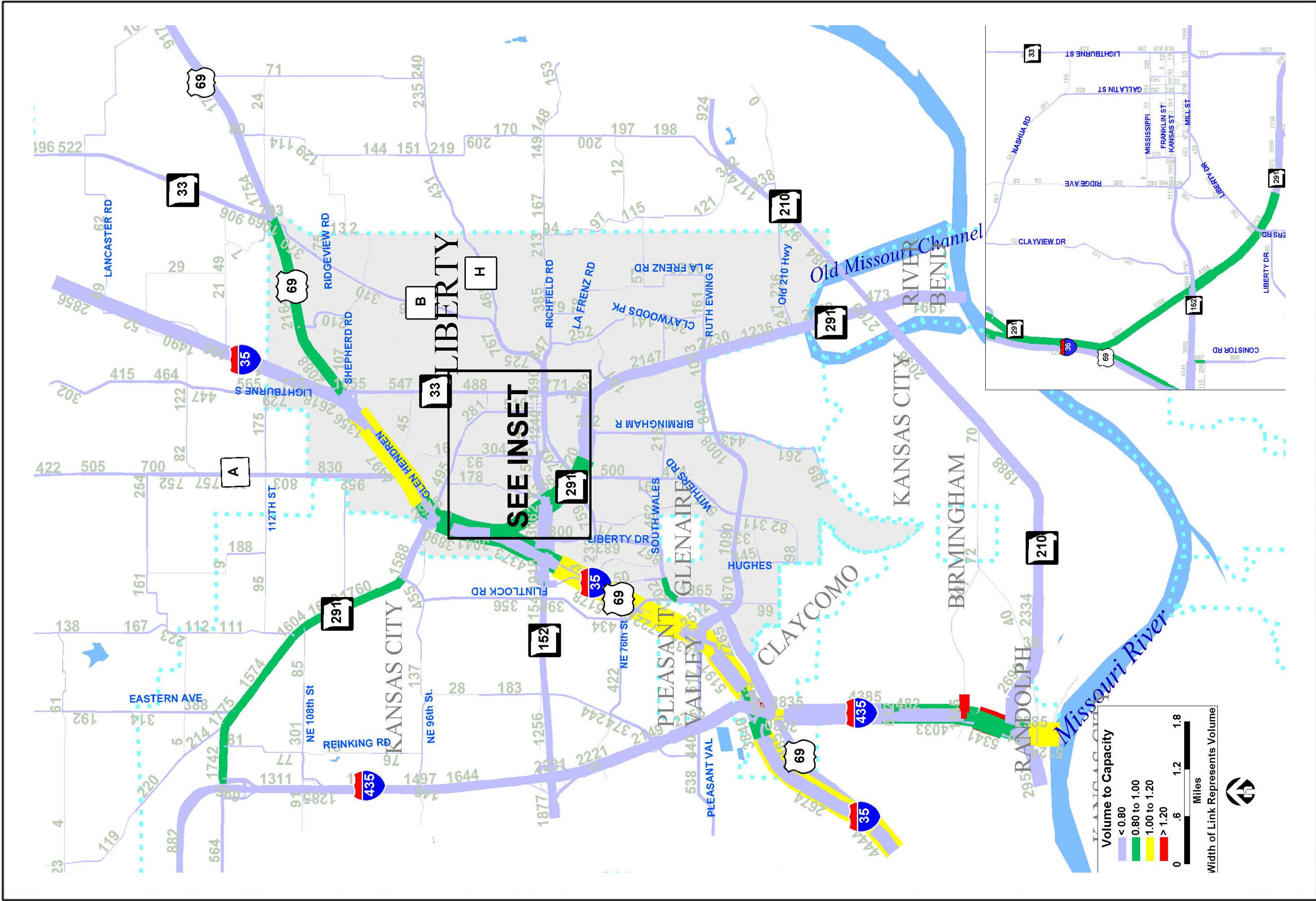
Traffic Demand

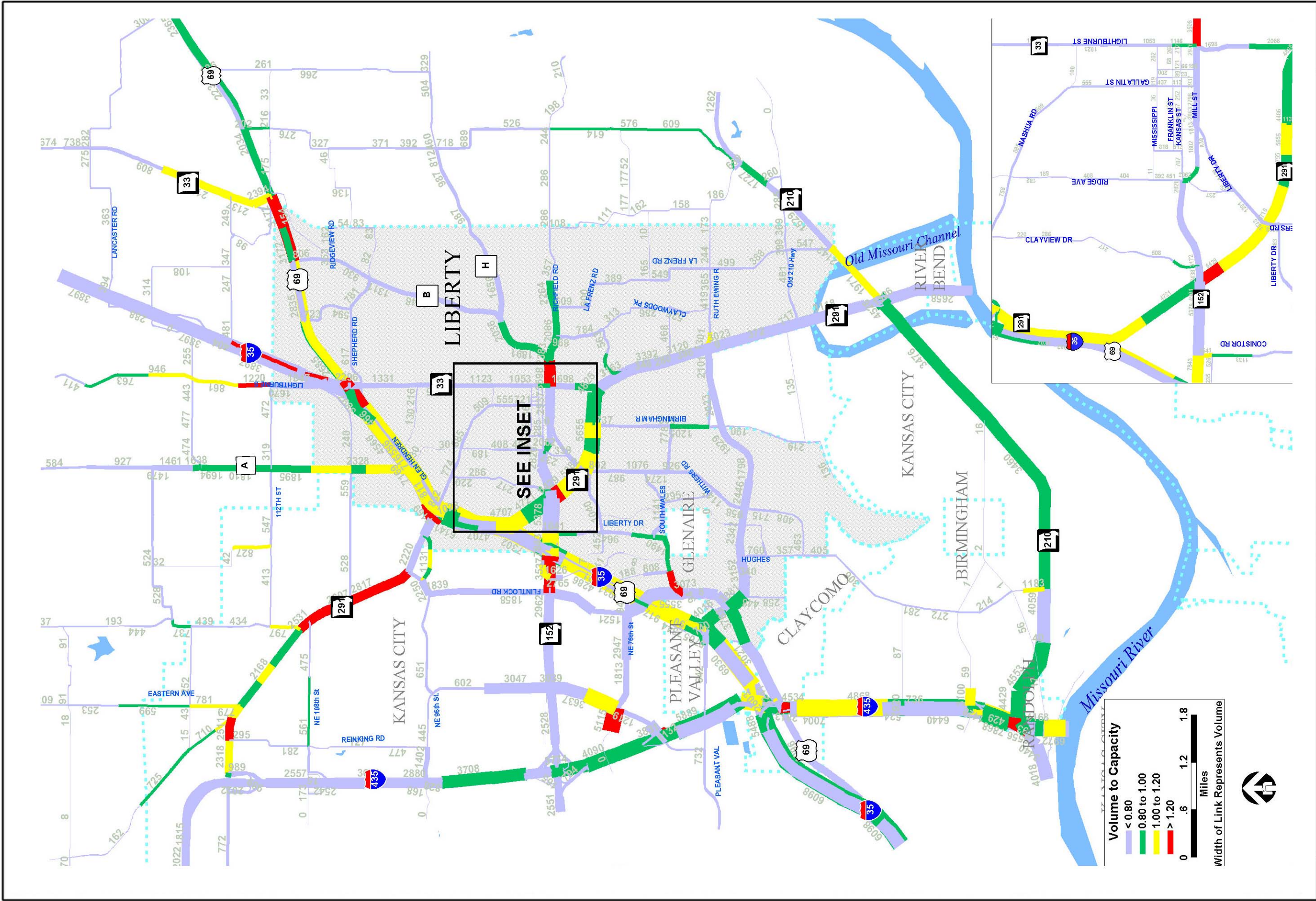
Detailed traffic analysis was performed for the South Liberty Parkway. **Figure 8 through 10** shows future South Liberty Parkway mainline model volumes for the three alternatives analyzed. Detailed traffic analysis includes level of services analysis for arterial travel speed and intersection delay. In addition, corridor measures of effectiveness were developed



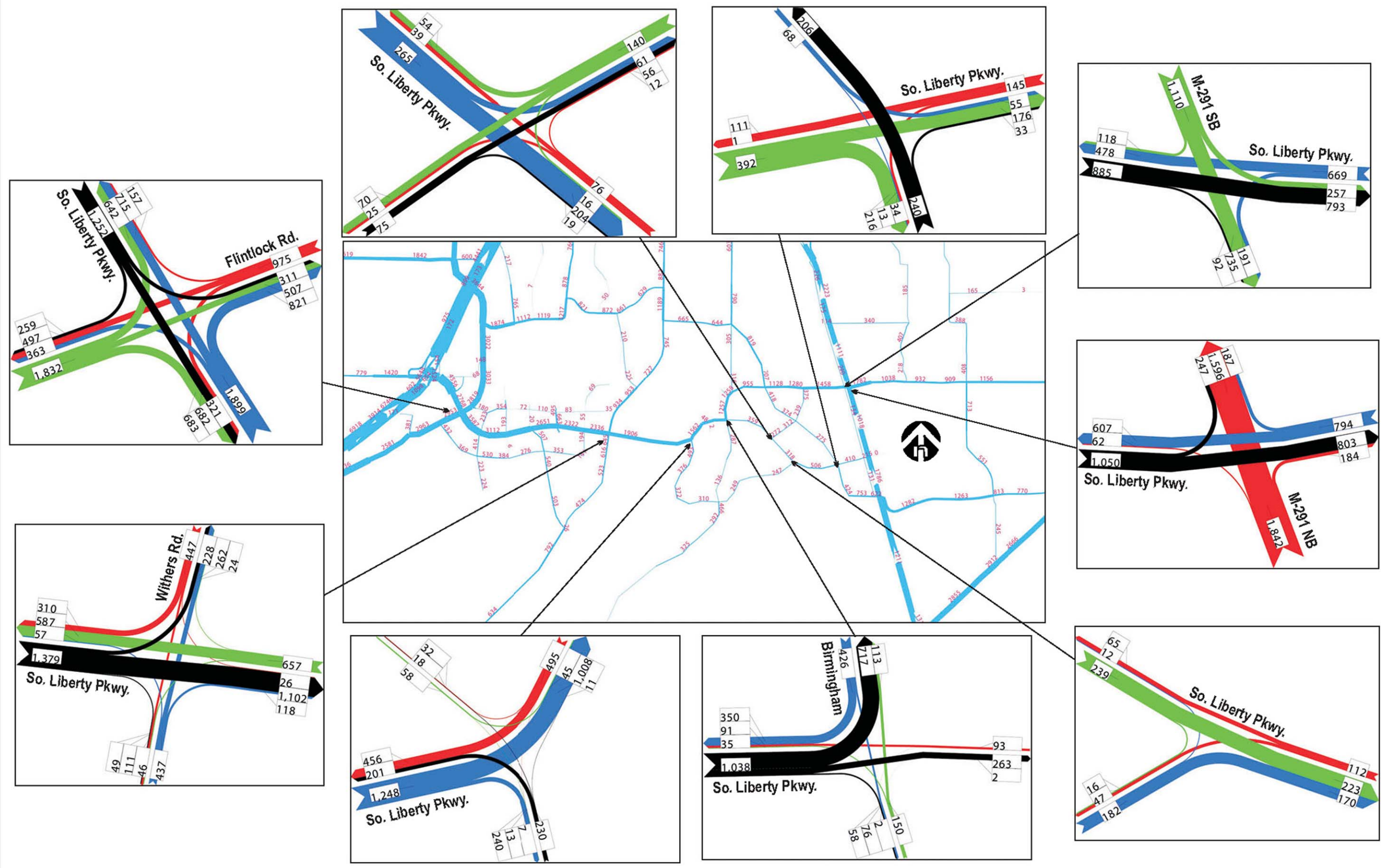








South Liberty Parkway Section Study
Forecasted PM Peak Hour Volumes



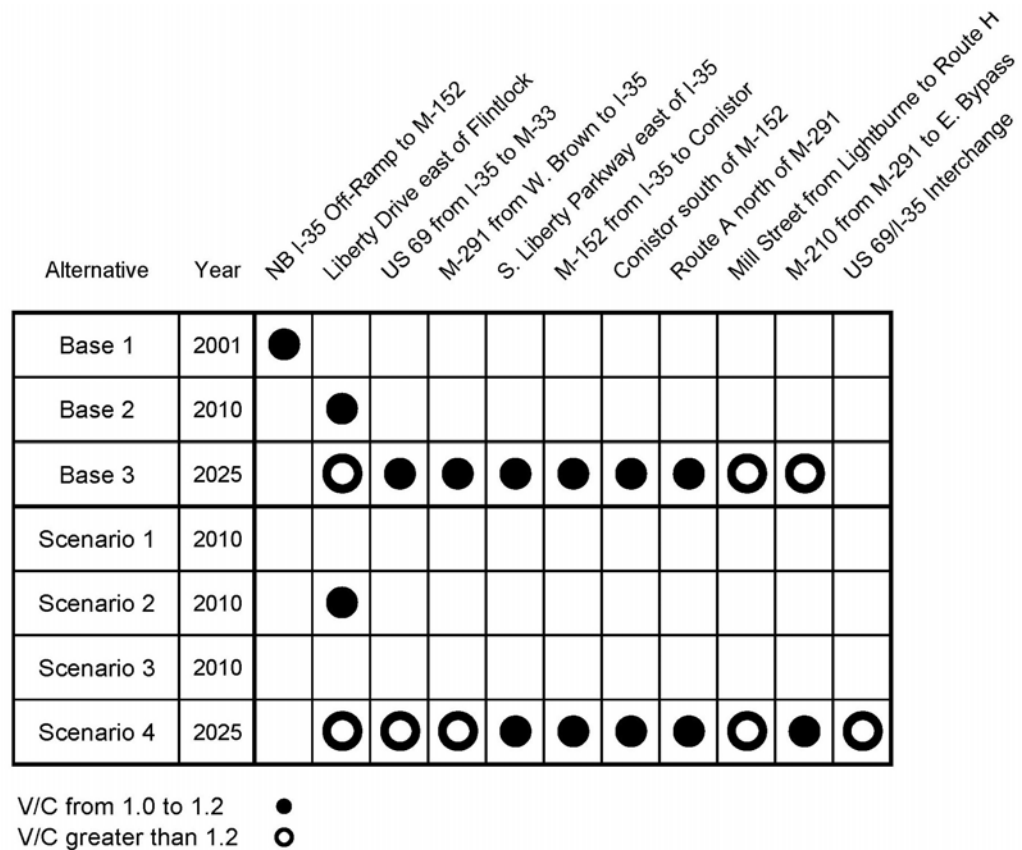


Table 13: Summary of Roadway Capacity Problems Within the Current City Limits (Excluding I-35)

South Liberty Parkway	Phase 1 Study (2003 Study)	Phase 2 (2005 Study)
I-35 to Flintlock	4,100	4,600
Flintlock to Wither Road	3,800	3,600
Wither Road to Birmingham	2,300	1,900
Birmingham to M-291	2,200	800

Source - Liberty Travel Demand Model

Table 14: 2025 PM Peak Hour Two-Way Forecast Comparison

using the simulation model.

Level Of Service

Using the turning volumes from the travel demand model, traffic operational characteristics

were analyzed. **Exhibit 15** identifies the study intersections for South Liberty Parkway. Based on the traffic analysis, **Exhibits 16 through 18** show the LOS results of the roadway segments and intersections. **Table 15** also shows intersection level of service results.

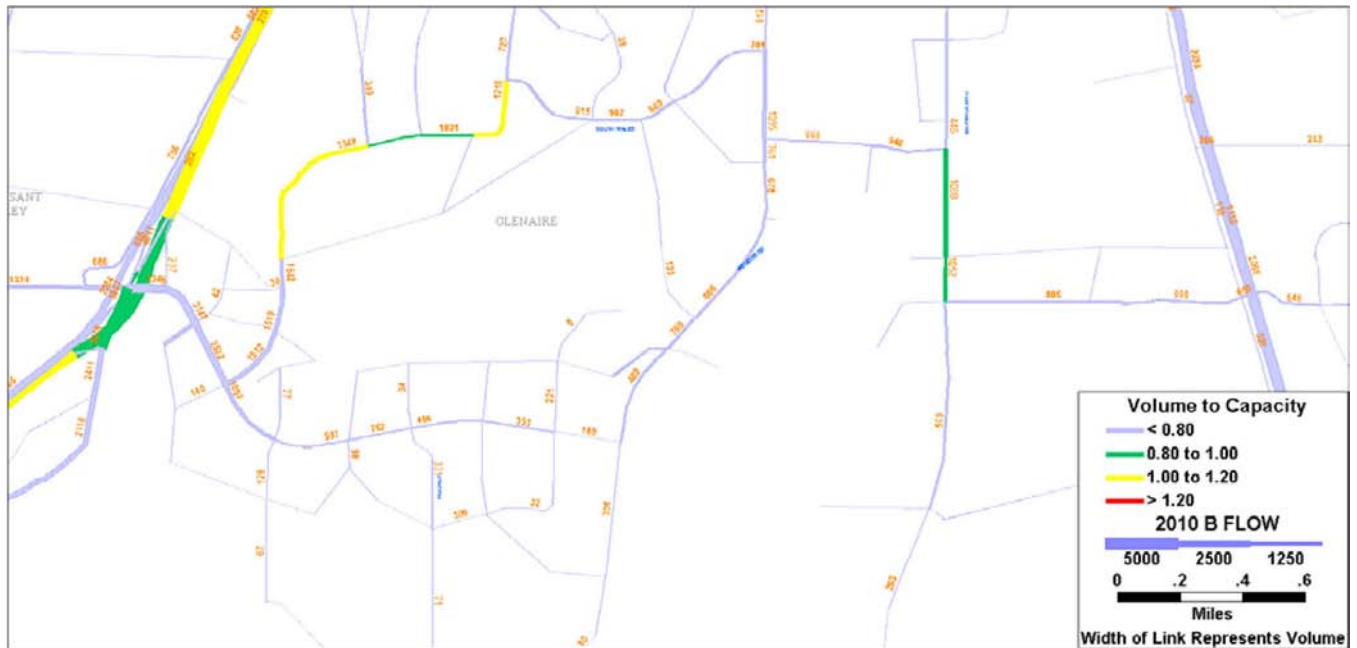


Figure 8: Traffic Demand along South Liberty Parkway 2010 Base (B2), PM Peak Hour

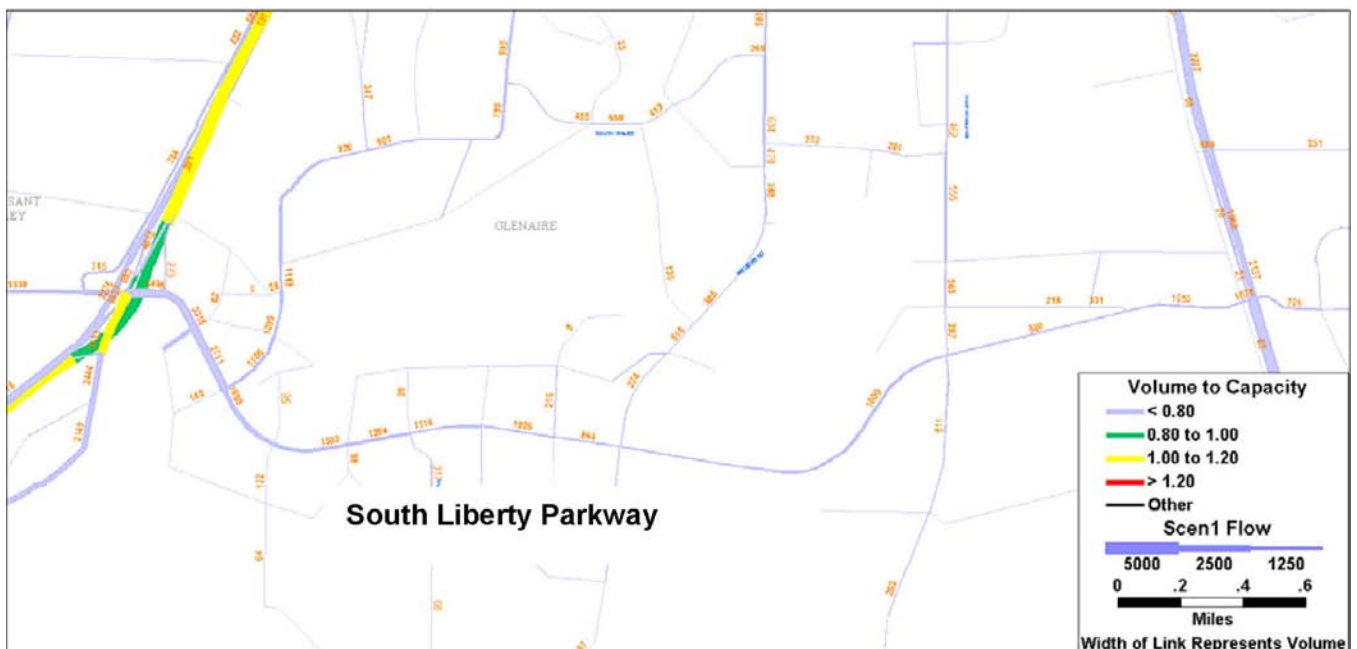


Figure 9: Traffic Demand along South Liberty Parkway 2010 Base Plus Extension of South Liberty Parkway to M-291 (S1), PM Peak Hour



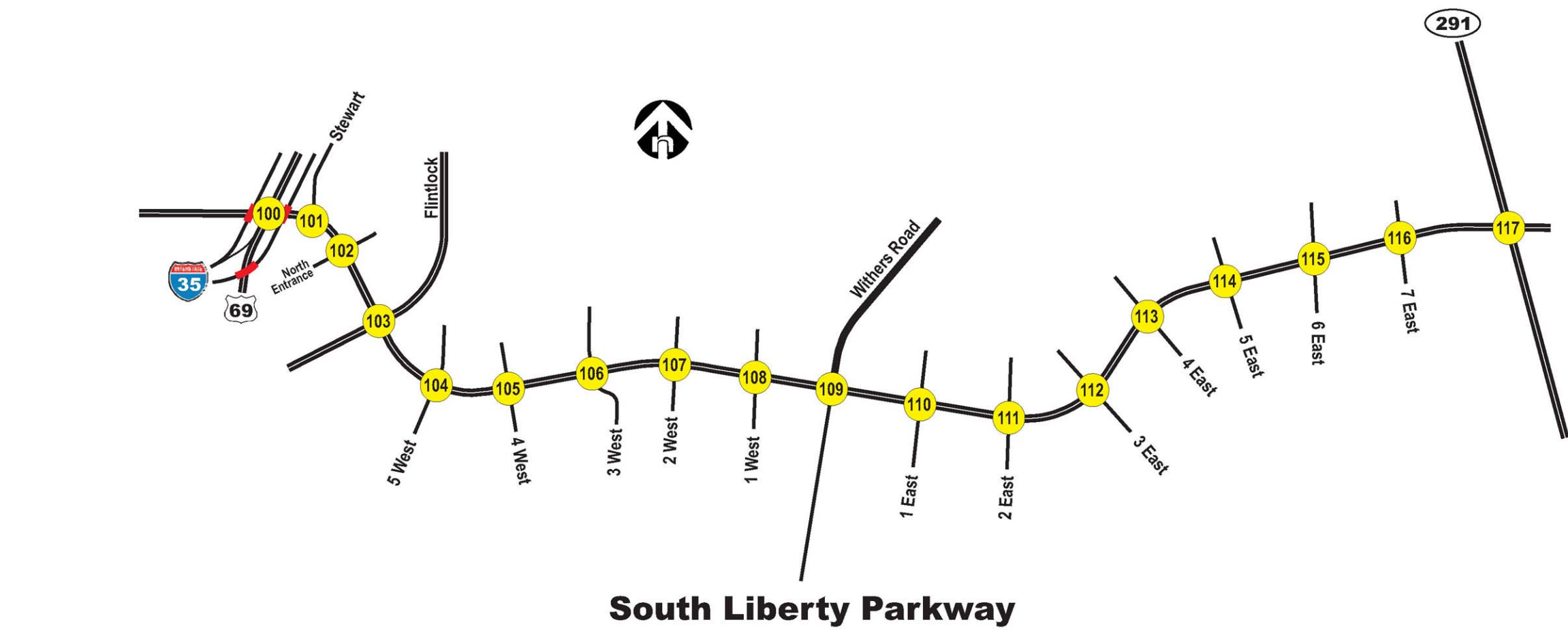
Figure 10: Traffic Demand along South Liberty Parkway 2025 Base (B3), PM Peak Hour

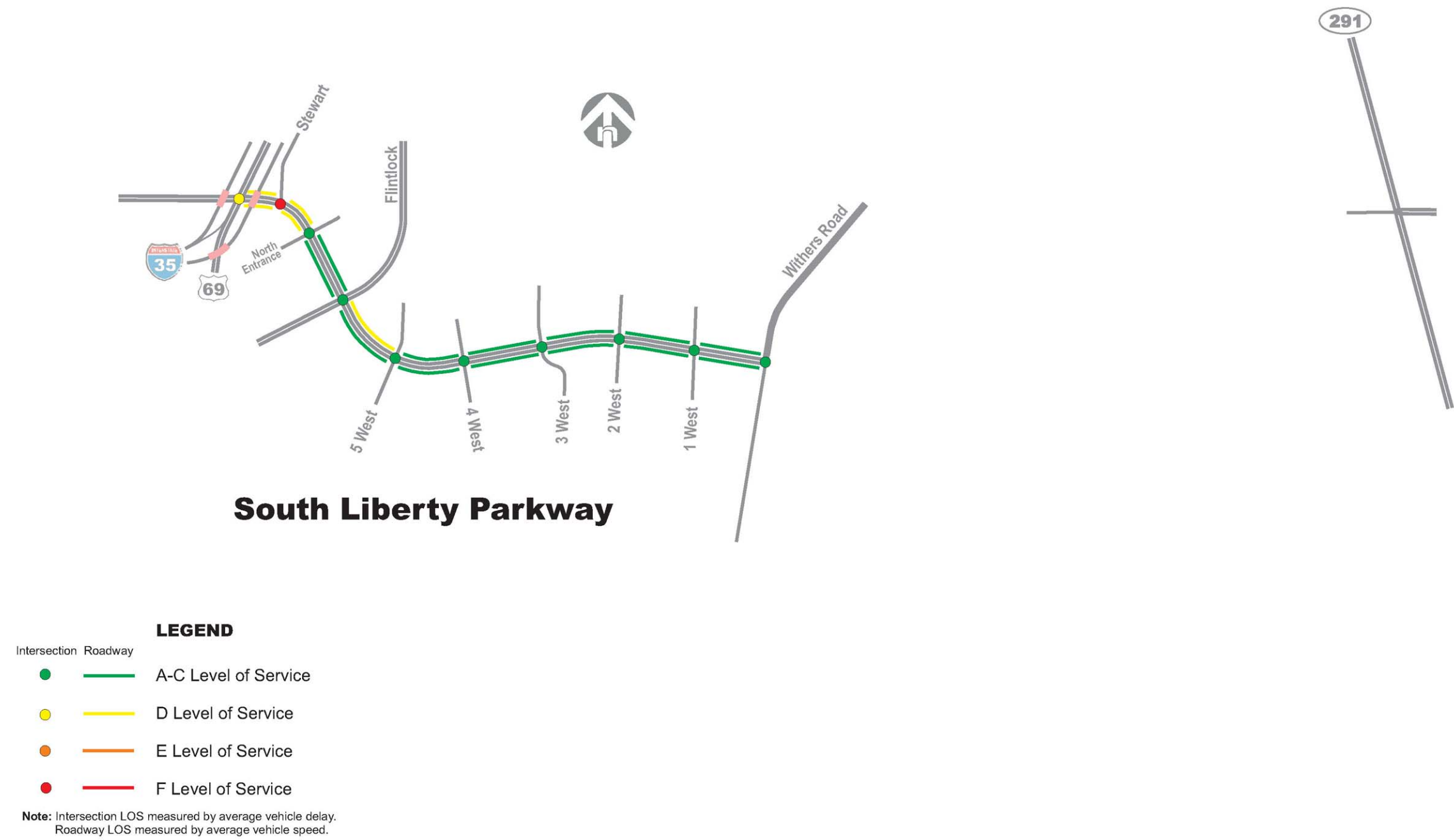
ID	Intersection Cross-Street	Alt 1 (B2) 2010 LOS	Alt 2 (S3) 2010 LOS	Alt 3 (B3) 2025 LOS
100	I-35/US 69	D	D	C
101	Stewart	F	F	-
102	North Entrance	B	B	B
103	Flintlock Drive	B	B	E
104	5 West	B	B	C
105	4 West	A	A	B
106	3 West	A	A	B
107	2 West	A	A	A
108	1 West	A	A	B
109	Withers Road	A	A	B
110	1 East		A	B
111	2 East		A	A
112	3 East		A	A
113	4 East		A	A
114	5 East		A	A
115	6 East		A	C
116	7 East		A	B
117	M-291		D	D

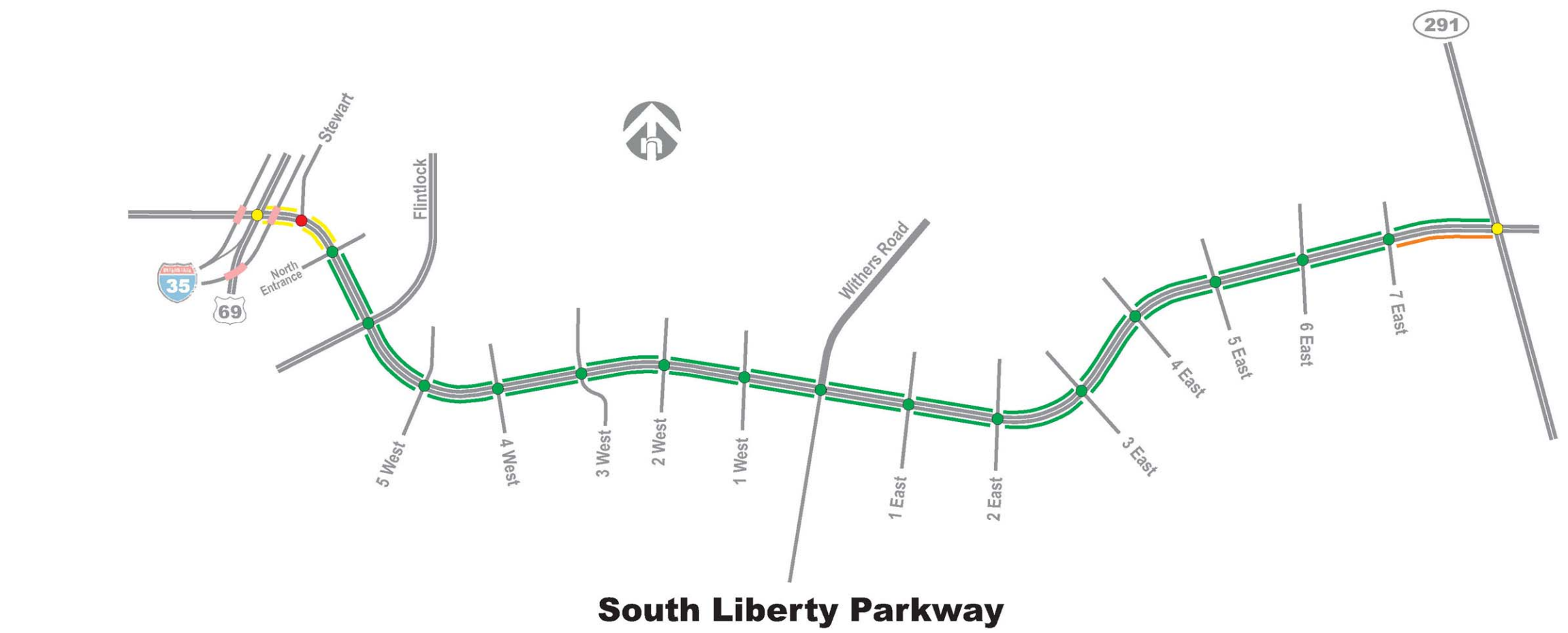
Source: Synchro 5.0

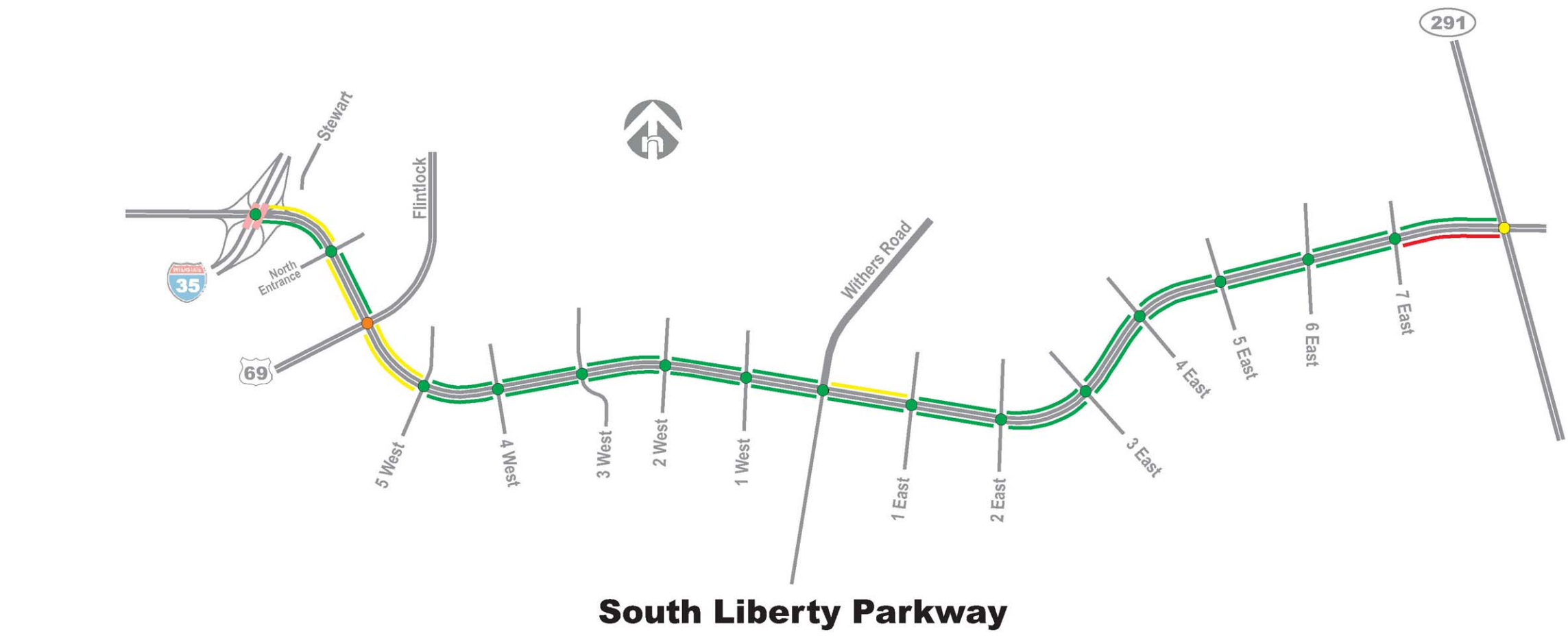
Table 15: PM Peak Hour Intersection Level of Service Operational Analysis

South Liberty Parkway Section Study
Study Intersections









LEGEND

Intersection Roadway

- — A-C Level of Service
- — D Level of Service
- — E Level of Service
- — F Level of Service

Note: Intersection LOS measured by average vehicle delay.
Roadway LOS measured by average vehicle speed.

Simulation Results

Synchro provides an analysis tool called SimTraffic, which provides a simulation/animation of traffic operations. Simulation models were developed for each of the three alternatives analyzed. Simulation model results provide a vision of future travel conditions for motorists on South Liberty Parkway.

Based on previous results and observed conditions, simulation analysis focused on the most critical roadway segment – South Liberty Parkway from I-35 to Flintlock. **Table 16** provides measures of effectiveness that represent the average of multiple simulation runs.

Table 16 shows the expected increase in transportation measures with the increase in traffic demand and land use between each alternative. The increase of Alternative 2 from Alternative 1 represents the additional attractiveness of the travel corridor when it extends all the way from I-35 to M-291. The increase of Alternative 3 from Alternative 2 represents the additional land use and growth from 2010 through 2025. (Note: US 69 is expected to be relocated to Flintlock by 2025. This results in increased traffic on Flintlock by pulling traffic from South Liberty Parkway between I-35

and Flintlock.)

2010 Concerns

By 2010, South Liberty Parkway from I-35 to Flintlock will be the area of most concern along South Liberty Parkway. The intersection of Stewart and South Liberty Parkway operates at an unacceptable level of service. However, more importantly, due to the median barrier required to separate eastbound traffic movements on South Liberty Parkway between I-35 and Stewart, weave distances, capacity and overall traffic operations are degraded. By removing the eastbound connection to Stewart Road and the eastbound barrier on South Liberty Parkway, overall traffic operations are improved by improving capacity, speed and level of service.

Using the simulation model, it was observed that for Alternative 1, 2010 base condition, travel speeds approaching the Stewart intersection increased 5 mph when the intersection of Stewart Road was removed from South Liberty Parkway. In addition, traffic flow was less turbulent as the weaving distance to the next closest intersection was increased from 660 feet to 1,100 feet.

Alternative	Vehicles (PM Peak Hour)	SLP and Cross Streets			SLP Only	
		Total Delay (hr)	Delay / Vehicle (sec/veh)	Stops / Vehicle	Speed (mph)	Travel Time (min.)
Alt. 1 (B2), 2010	5,950	105	64	1.5	15	2.8
Alt. 2 (S1), 2010	6,125	125	73	1.6	15	2.8
Alt. 3 (B3), 2025	9,250	360	140	1.6	16	2.7

SimTraffic version 5.0

Table 16: South Liberty Parkway Simulation Model Performance Measures (I-35 to Flintlock, PM Peak Hour)

2025 Concerns

South Liberty Parkway from I-35 to Flintlock will continue to be the area of most concern along the South Liberty Parkway. By 2025, travel demand results also indicate that traffic volumes may exceed the capacity of a 4-lane urban arterial. Simulation results indicate that slow travel speeds and long queues are a result of a lack roadway and intersection capacity in this heavily traveled segment. In 2025, improvements such as a single-point diamond interchange with I-35 and the relocation of US 69 to Flintlock will provide significant benefits. Due to the relocation of US 69, traffic volumes increased only slightly between 2010 and 2025 on South Liberty Parkway between I-35 and Flintlock.

Access Management

Liberty's investment in mobility, accessibility and safety are maximized when good access management practices are applied. Access management is the planning and design of points of access to the public

roadway system. South Liberty Parkway will be designated as a principal arterial by the City which means the highest degree of access control for a city street is preferred. Within the corridor, ¼ mile signal spacing is recommended to maximize traffic operations and safety. This standard corresponds to national research and MoDOT standards for principal arterial roadways.

Phase 2 (Withers Road To M-291)

Figure 11 shows the Synchro operational traffic model developed by Hall Planning & Engineering (HPE) for the Phase 2 analysis. The model replicates traffic operations of a multi-way boulevard using forecasted PM peak hour volumes from the updated Liberty Travel Model.

Synchro results indicate:

- LOS at signalized intersections is LOS B and C with no individual movement worse than LOS D.

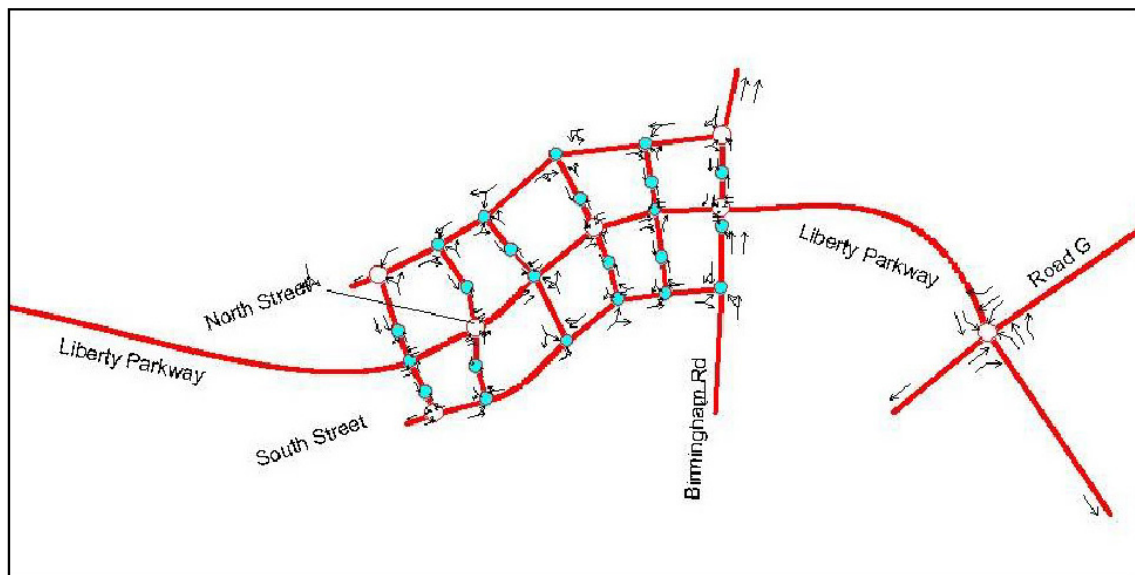


Figure 11: Synchro Model

- Left turn delay at the two-way stop controlled intersections from the minor street onto South Liberty Parkway will be LOS F during the peak hour.
- Special attention may be needed for the heavy traffic movement between South Liberty Parkway and Birmingham.

Synchro is not capable of analyzing the one-way streets adjacent to the primary through lanes of the boulevard concept. Once development is proposed along the corridor and the specific land uses are known, a more detailed traffic should be produced to determine the viability of the multiway boulevard concept. Until that time, the primary thru lanes can be constructed to serve through traffic. **Appendix A** provides HPE's report containing a more detailed discussion of the multiway boulevard concept.

Conclusions

This traffic study developed a new PM peak hour travel demand model for the City of Liberty in Phase 1. This was updated in Phase 2 with new land use and roadway network assumptions. A simulation model for South Liberty Parkway was also developed and was used for the Phase 1 and Phase 2 analysis. The travel demand and simulation models are planning tools that can be continually used by the City to analyze the dynamic landscape of the City of Liberty. Changes in land use, roadway improvements, more detailed data, and "what if" questions can all be analyzed with these new tools.

In addition to creating new planning tools for the City, future roadway capacity was analyzed at the macro-level to identify potential problem areas not currently being addressed by the City. Also, a simulation model provided operational analysis of the South Liberty Parkway corridor. The following sections provide a summary of the conclusions.

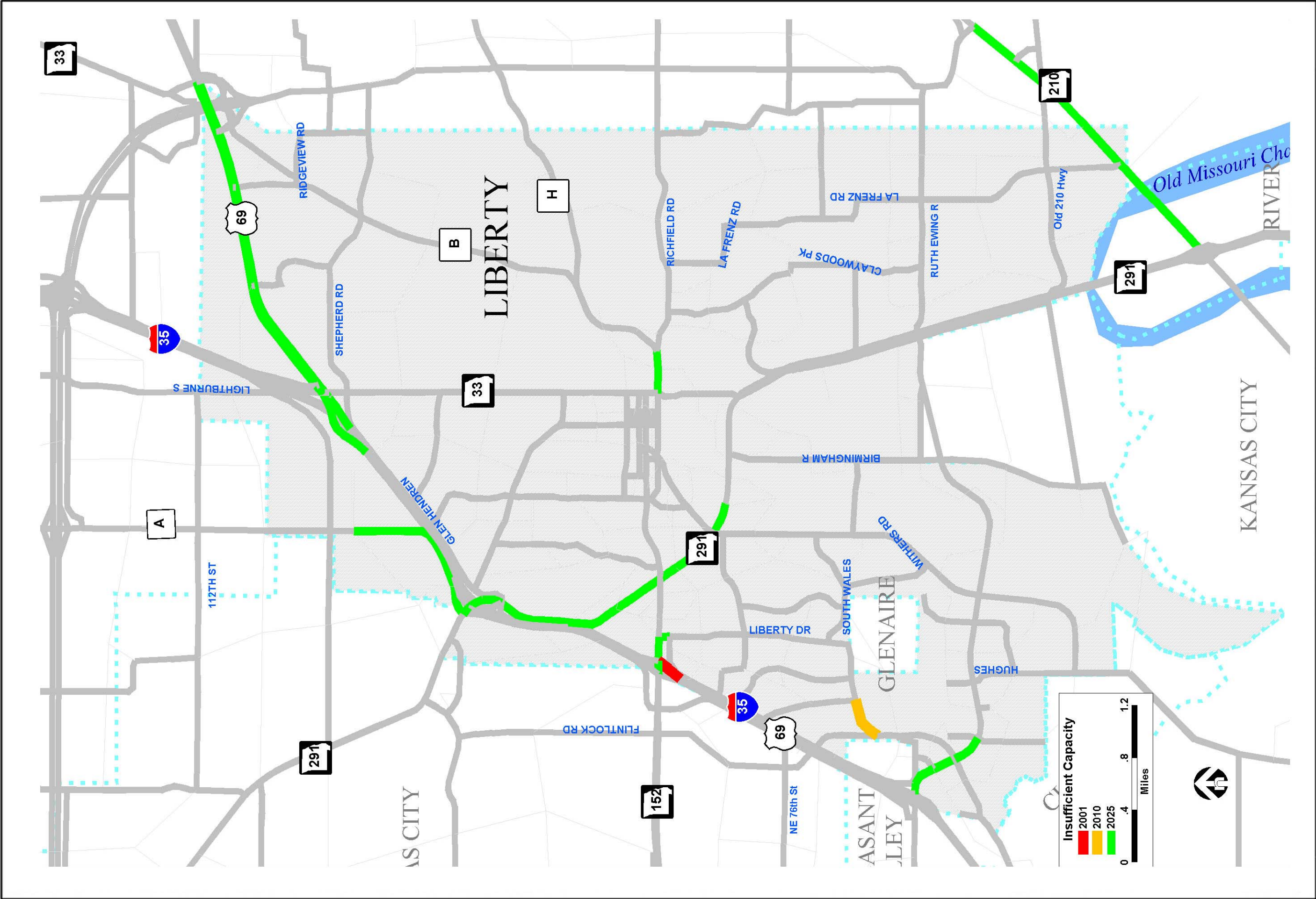
Phase 1 (I-35 To Withers Road)

Travel Demand Model Results

Based on the land use assumptions provided by City staff, traffic in the area is expected to see unprecedented growth in household and employment over the next 25 years. This is evident by the increase in land use and traffic 2001 through 2025. Vehicle trips in the model Study Area are expected to increase by 29% from 2001 through 2010 and 144% from 2001 through 2025. Some of this increase in vehicle trips occurs outside the City of Liberty, within Kansas City, Missouri, but a significant amount occurs inside the City of Liberty's boundaries. Regardless, the City of Liberty is poised to be one of the fastest growing areas in the metropolitan region.

Identified committed and planned roadway improvements will help address the expected growth in traffic. Based on volume to capacity analysis, some roadways are expected to have capacity problems above anticipated levels. These roadway segments were identified in the study and are summarized in **Exhibit 19**. These roadway segments represent key locations where traffic volume exceeds planned and committed roadway capacity improvements and where more detailed study is needed. Critical segments include:

- South Liberty Parkway from I-35 to Flintlock (may need to be improved to six-lanes)
- M-152 from I-35 to Conistor (may need to be improved to eight-lanes)
- M-291 from I-35 to W. Brown (may need to be improved to six-lanes)
- Route A north of M-291 (may need to be improved to four-lanes)
- US 69 from I-35 to M-33 (may need to



be improved to six-lanes)

What-If scenarios were analyzed using the travel demand model. The primary question to be answered was the prioritization of building the extension of South Liberty Parkway from Withers to M-291 or Flintlock from South Liberty Parkway to M-152. Based on travel measures of effectiveness it was concluded that the City of Liberty should build the extension of South Liberty Parkway before the Flintlock extension. The South Liberty Parkway extension should be built first because it has targeted benefits to Liberty, whereas the Flintlock improvement has benefits to areas outside of the City of Liberty. Building the South Liberty Parkway extension from Withers to M-291 provides the lowest VHT and VMT within the City limits. It also provides a reduction in traffic demand on one of the City’s most heavily congested corridors, M-152. The South Liberty Parkway extension is also a benefit to Liberty’s economic growth.

South Liberty Parkway Results

South Liberty Parkway is currently being built from I-35 to Withers Road. When the entire corridor is completed from I-35 to M-291, the new roadway will provide an alternative travel route for Liberty motorists, provide relief to existing Liberty roadways opening up land for new development. Traffic analysis results indicate that a four-lane facility for South Liberty Parkway will generally serve the entire corridor with anticipated development

using good access management guidelines. The one exception is the most heavily traveled roadway segment on South Liberty Parkway, I-35 to Flintlock, which is expected to carry local and through traffic. The heavy traffic demand at this location may require a six-lane section before 2025. The City may also consider revising downward the land use density on the west side of the corridor in order to eliminate the need for a six-lane section.

Another concern is the intersection of Stewart Road and South Liberty Parkway. In 2010, this intersection operates at an unacceptable level of service for a stop controlled intersection. In order to accommodate this intersection, roadway geometrics are compromised, creating undesirable operating conditions for South Liberty Parkway. Elimination of the eastbound access to Stewart will improve operations in this part of the corridor.

Phase 2 (Withers Road To M-291)

Updated traffic forecasts for the study were developed in Phase 2 based on revised land use and roadway network in the study area. **Table 17** shows the change in the 2025 PM peak hour forecasts along South Liberty Parkway as a result of the changes.

Preliminary traffic analysis conclusions indicate that within the capabilities of Synchro to accurately model a multi-way boulevard, the proposed town center network is capable of providing a safe and efficient operating system for all modes of travel.

South Liberty Parkway	2025 PM Peak Hour Traffic Change
I-35 to Flintlock	12% Increase
Flintlock to Wither Road	5% decrease
Wither Road to Birmingham	17% decrease
Birmingham to M-291	64% decrease

Source - Liberty Travel Demand Model

Table 17: Change from South Liberty Parkway Phase 1 Traffic Forecast to Phase 2 Traffic Forecast

6.0 Economic Analysis

Between June and September of 2003, Economic Research Associates, Inc. (ERA) completed market, demand, and value capture analyses for Phase 1 of the South Liberty Parkway. These reports are in **Appendix D - South Liberty Parkway Corridor 2003 Market, Demand Forecasts, And Value Capture Analysis**. As part of Phase 2 of the Section Study, ERA has prepared an update to the potential revenue generation and supportable infrastructure investment.

Following the adoption of the Consensus Land Use Plan and the updates to City Travel Demand Model, ERA developed the updated economic analysis for the South Liberty Parkway corridor. The analysis included potential revenue generation and the supportable infrastructure investment resulting from the planned land use and projected traffic along the corridor. The analysis also served to update the analysis prepared in 2003 as part of the South Liberty Parkway Corridor Study.

Based on existing tax rates, the proposed land use, and the associated development potential in the corridor, the economic analysis projects that total 40-year fiscal revenues to the City of Liberty will be approximately \$291 million; \$75 million over the first 20 years. This expanded development program is also predicted to result in \$88 million in supportable public investment over a 40 year period, \$39 million of which occurs in the first 20 years. ERA's updated analysis is contained in **Appendix E – South Liberty Parkway Corridor Market And Value Capture Analysis Updates**.



APPENDIX A:

ANALYSIS OF MULTIWAY BOULEVARDS ALONG LIBERTY PARKWAY TOWN CENTER





MEMORANDUM

TO: Kevin Wallace, P.E.
HNTB Corporation

FROM: Richard A. Hall, P.E.
President

DATE: October 20, 2005

SUBJECT: Analysis of Multiway Boulevards along Liberty Parkway Town Center

Per your request, HPE has prepared the following information on multiway boulevards as an important part of the thoroughfare network for future town centers along Liberty Parkway.

Background

Liberty Parkway is an arterial street planned for South Liberty, Missouri. Although the parkway is intended to carry traffic between a number of "town centers", HPE focused on the ability of the parkway to move pedestrians and vehicles within the town centers.

Transportation engineering and land planning practice over the last 50 years have tended to isolate development from arterial streets in an attempt to serve vehicle mobility while limiting access to land. Several negative side effects appeared including limiting the number of street connections. These limited connections become congested and local traffic is forced to use the arterial for local travel. The speed and noise of a typical arterial street creates an unpleasant environment for development along the street, an added negative impact. Development along arterials is typically planned with large parking lots fronting the arterial and strip centers or big box retail set back at some distance from the street. This pattern of development is incompatible with town center planning concepts that encourage walking, biking and transit use. HPE's recommended approach to creating viable town centers along the South Liberty Parkway is to design the parkway to evolve into a multiway boulevard in the proposed town center areas.

This memo describes the general design and function of a multiway boulevard, how one might function as part of the Liberty Parkway town center design plan, and how the parkway can be designed today to allow multiway boulevards to develop in the future.

Description of Multiway Boulevards

A multiway boulevard is a street design that can simultaneously handle large volumes of through traffic while encouraging street-front development appropriate for a town center. The concept and operating characteristics of multiway boulevards are described comprehensively by Allen Jacobs and Elizabeth McDonald in *The Boulevard Book*, the source for much of the information related here.

The multiway boulevard is a time-tested concept found worldwide. Several fine examples were built at the end of the 19th century in New York, and a modern multiway boulevard has been constructed in Chico, California.

Structure of a Multiway Boulevard

The center of a multiway boulevard is comprised of 4 or 6 lanes. These lanes serve the traditional function of an arterial street – to move automobiles as quickly and safely as possible. The generic section of a multiway boulevard is shown in **Figure 1**. The center lanes are considered the “motor vehicle realm”, and most design considerations follow the motor vehicle mobility function, just as with contemporary arterial design. A key concession to pedestrians is that speeds are managed in the 30-35 mph range by techniques such as narrower lanes and shorter blocks.

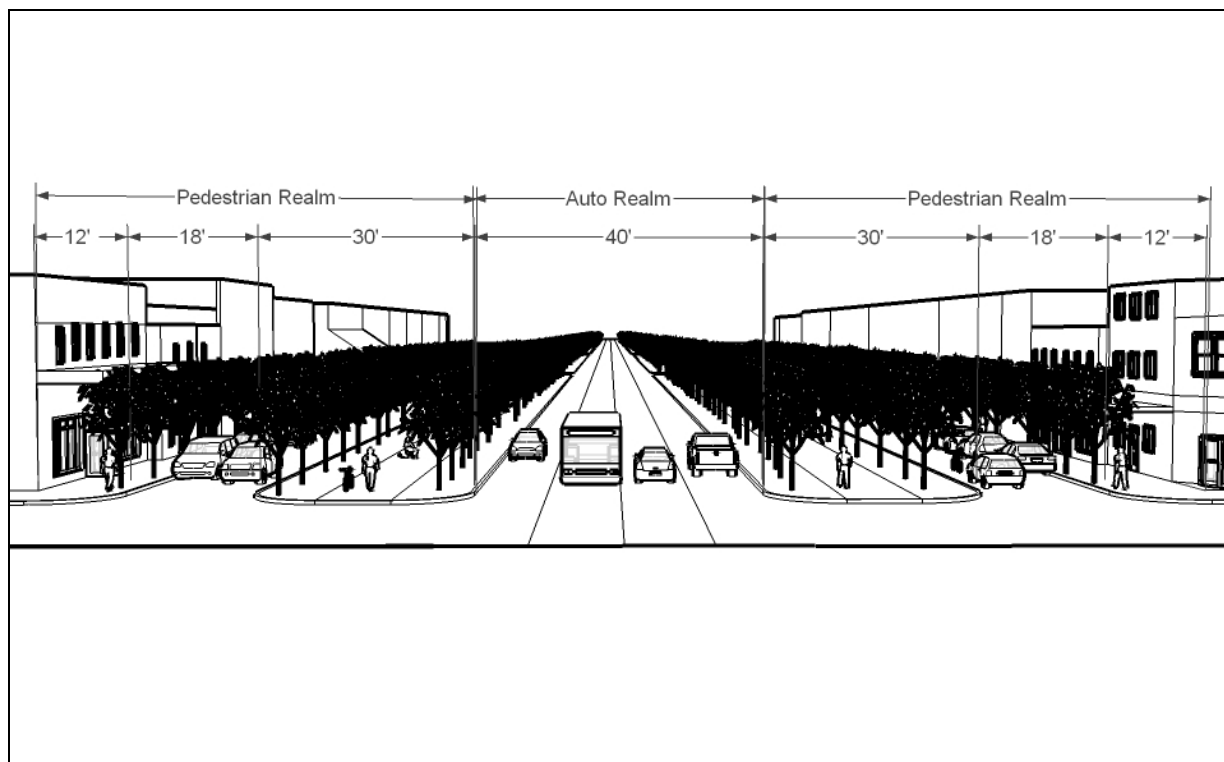


Figure 1: Multi-way Boulevard Structure

On either side of the center lanes are very wide park-like medians with shared-use paths, a one-way access lane, a lane of on-street parking, a wide sidewalk, and street-front buildings. Some variations have parking on both sides of the one-way access lanes, depending on development intensity. The one-way access lanes are designed for speeds of 15 mph. This area, from the inner edge of the median adjacent to the center travel lanes to the front of the buildings, is considered the “pedestrian realm”. Within this area, design considerations place the pedestrian function first, with great walkability as the primary design goal.

Although not shown in the street section, but illustrated in **Figure 2**, the network of streets behind the buildings provides for local circulation.

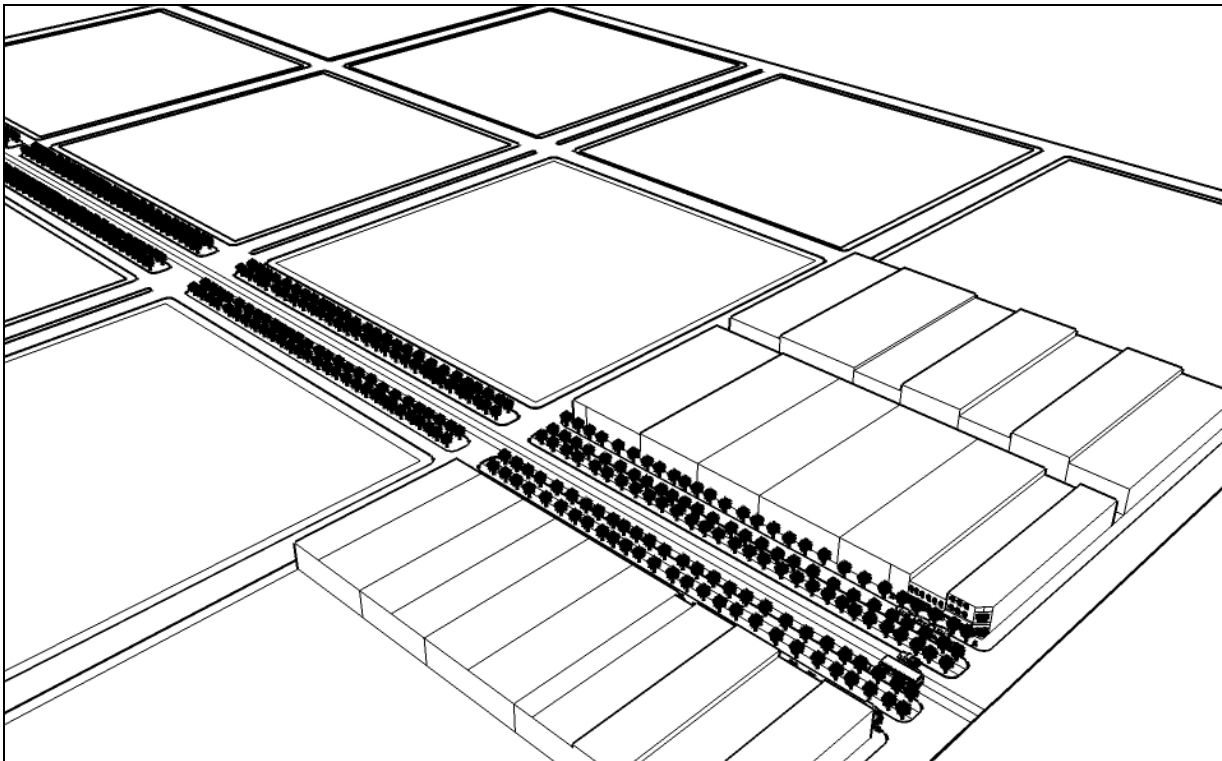


Figure 2: Perspective of town center street network adjacent to tree-lined multiway boulevard

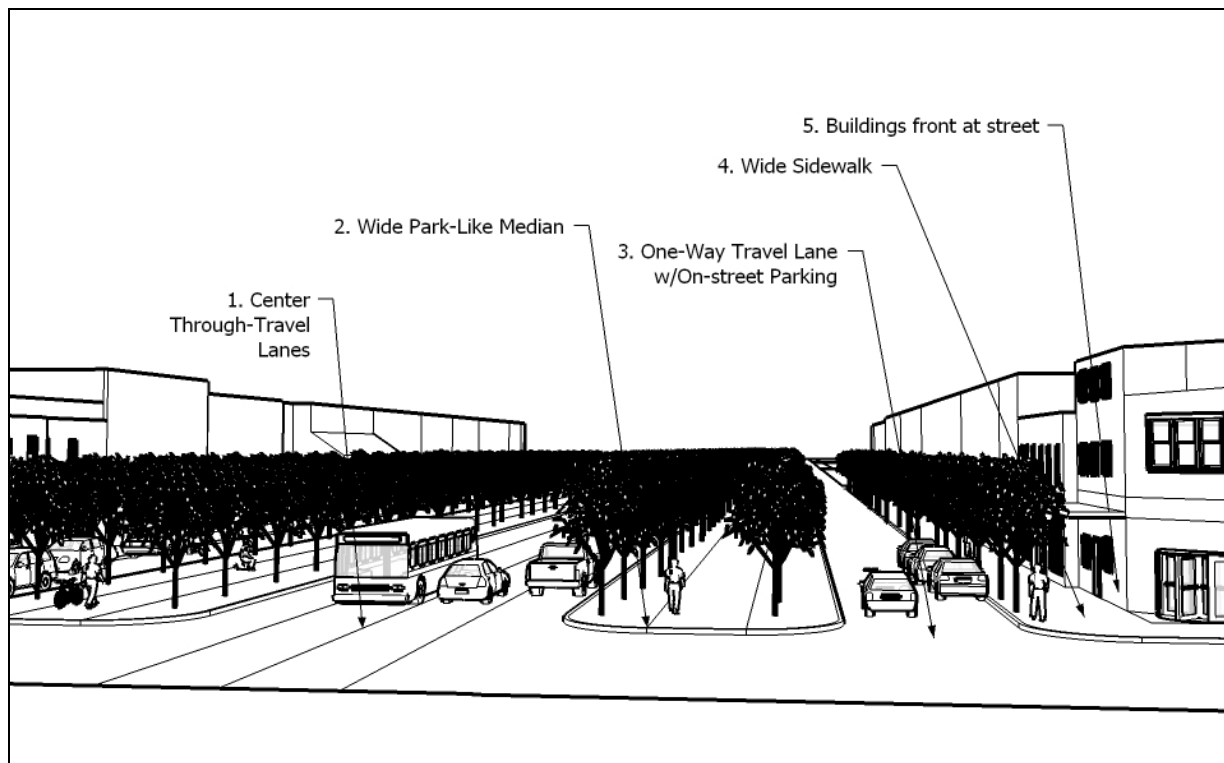


Figure 3: Components of a Multiway Boulevard

Function of a Multiway Boulevard

Each element of the multiway boulevard is illustrated in Figure 3 and the function is described below:

1. Center through lanes: These lanes do the “heavy-lifting” of traffic movement, allowing large volumes of traffic to pass through the area. They also bring potential customers within viewing distance of the shops and storefronts built along the one-way side streets.

2. Wide park-like median: These side medians mark the beginning of the pedestrian realm. Planted rows of trees provide enclosure, helping to manage center street speeds. The median provides shade and protection for pedestrians and the shared-use path allows bicycling, roller-blading, and strolling, with ample benches and pedestrian features. The median is a centerpiece of the town center design, much as a park would be in a traditional town design such as Savannah, GA.

3. One-way access lanes: The one-way access lanes, in plan view of the multiway boulevard are essentially parking access lanes. These lanes are parallel to the central lanes and are oriented generally perpendicular to the arterial street. These one-way connections serve the following functions:

- Provide a quiet street for the store fronts facing the arterial, analogous to a park view main street due to the wide median
- Provide vital on-street parking and pedestrian connections between blocks
- Allow locally circulating traffic to make easy right-hand turns while circling the block, looking for parking
- Allow local traffic to access parking without getting on the arterial street

4. Wide sidewalk: Sidewalks adjacent to parking allow pedestrian traffic to circulate freely between store fronts and the median park area. The wide sidewalks provide necessary space for pedestrian shopping and travel needs while still leaving room for a few sidewalk café tables, a sidewalk sale rack of clothes or table of used books, and of course street trees and plantings.

5. Store fronts: Provide economic viability for the town center. On-street parking goes away as speeds are increased to 40 or even 55 mph, destroying the viability of mainstreet shops. New development located far from the street requires massive amounts of parking and infrastructure, all of which are beyond the means of local businesses.

Store fronts along the multiway boulevards are provided with the best of both worlds – reasonable access to pass-by traffic, and a calmed, walkable lane front that functions like the old traditional downtown park street. The store fronts also send a clear message that this is the “town center”, a message that is difficult to convey with conventional arterial design.

How does the traffic circulate?

An often voiced concern is the effect cross streets will have on the level of service of the through travel. Traditional, walkable town centers have small block sizes, on the order of 500 to 600 feet, less than half the recommended distance between arterial intersections. Small block size is vital to walkability and the gathering function of the town center. Small block size tends to manage speed to a level more comfortable for pedestrians.

HPE has modeled the multiway boulevard using Synchro (TrafficWare, Inc.), a micro simulation traffic modeling program. Synchro is not designed to explicitly evaluate the small-scale design elements of a multiway boulevard. In addition, as described by Jacobs and McDonald in *The Boulevard Book*, driver behavior on the low-speed access lanes is different from that generally assumed for higher speed arterial traffic.

The cross-street intersections were accurately analyzed within Synchro. A baseline network the South Liberty Parkway was simulated with the town center intersections as shown in **Figure 4**. This network was loaded with traffic per HNTB's traffic model as provided to HPE. Under this scenario, the overall arterial LOS on the town center portion of the Liberty Park was “B”, in each direction, with an arterial speed of 32 mph (assumed flow speed was 45 mph.)



Figure 4: Liberty Parkway Baseline Network

HPE then created a second simulation network to represent the buildout of the town center with a multiway boulevard. Intersections were created approximately every 500 feet, with signalized intersections approximately every 1000 feet. This network is shown as **Figure 5**. The unsignalized intersections on South Liberty Parkway were allowed free flow, with full stops on the cross streets. In a multiway boulevard design, these intersections provide pedestrian and vehicle access across the arterial during the off-peak periods, with the signalized intersections providing less-convenient but more reliable access points during the peak periods.

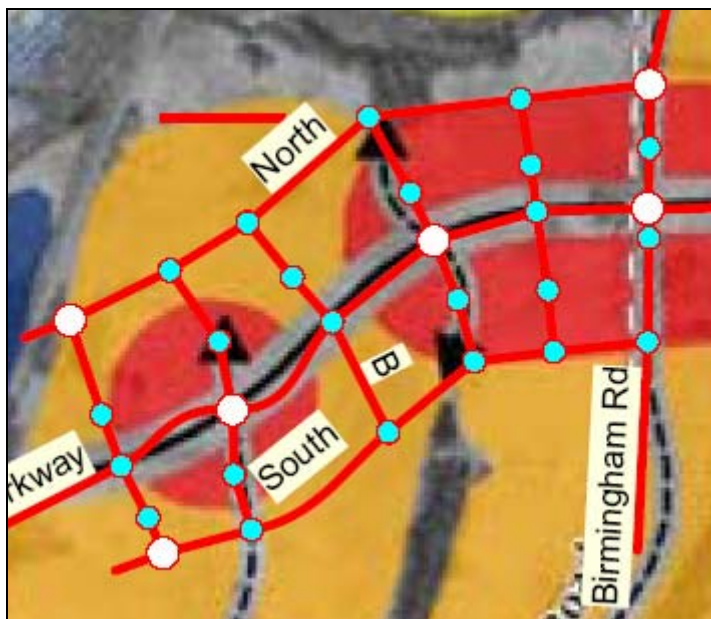


Figure 5: Liberty Parkway Town Center Network

Under a second simulation, the overall LOS of Liberty Parkway decreased to LOS C with the addition of the more frequent cross streets. In many urban areas, LOS D is the accepted level

of performance, as this level of traffic and congestion are generally associated with busy, economically productive area. HPE increased traffic through the Synchro Network (using the traffic Growth Factor function) until arterial LOS fell below D. At 130% of HNTB's projected future traffic, the eastbound arterial LOS fell to E, although the westbound LOS remained at C.

Within the ability of Synchro to accurately model a multiway boulevard, HPE believes that these results indicate that addition of town center cross streets will not cause the road to fail even with elevated levels of traffic.

Planning for Future Multiway Boulevards

Today, there are no town centers along the South Liberty Parkway alignment. As the planned town centers become economically viable and the need for the town centers materializes, Liberty Parkway must be able to morph from a rural highway into a multiway boulevard. The following steps are recommended:

Determine a multiway boulevard general cross section and reserve appropriate ROW today.

HPE has provided a conceptual cross section for a Liberty Parkway Multiway Boulevard. This section could be used, or another could be created., Flexibility must be maintained for future town center designers. The cross section should err on the side of reserving too much ROW, rather than too little.

Prepare town center concept plans. These plans should not specify all streets within the entire town center; future designers will provide that level of design. At a minimum, however, they should identify the number of cross streets that are required and allowed along the multiway boulevard and establish applicable minimum distances between intersections. These will vary from conventional arterial design practice, so they should be codified and explicitly permitted in advance, to encourage urban development in the future.

The general town center plans should also specify walkable town center design, not conventional suburban practice which assumes motor vehicle mobility only.

Establish the staging for multiway boulevard development. The basic element of urban design at the boulevard level is the block. The multiway boulevards should be constructed as no less than an entire block face at a time. The original town center may be only a single block face at the corner of the major street intersection, but it should have all the elements of a multiway boulevard intact. As additional development occurs, it should occur in complete blocks as well, adjacent to or across from prior development.

Some elements of the design, such as the tree plantings in park medians, will be more economically added early, rather than block-by-block over time. As part of the town center general plans, the entire length of the multiway boulevard can be identified and planted appropriately. Other elements such as the shared use path can also be provided at this time, allowing the median to be established as a linear park long before development occurs adjacent to the park. **Figures 6-9** illustrate how the multiway boulevard might develop over time.

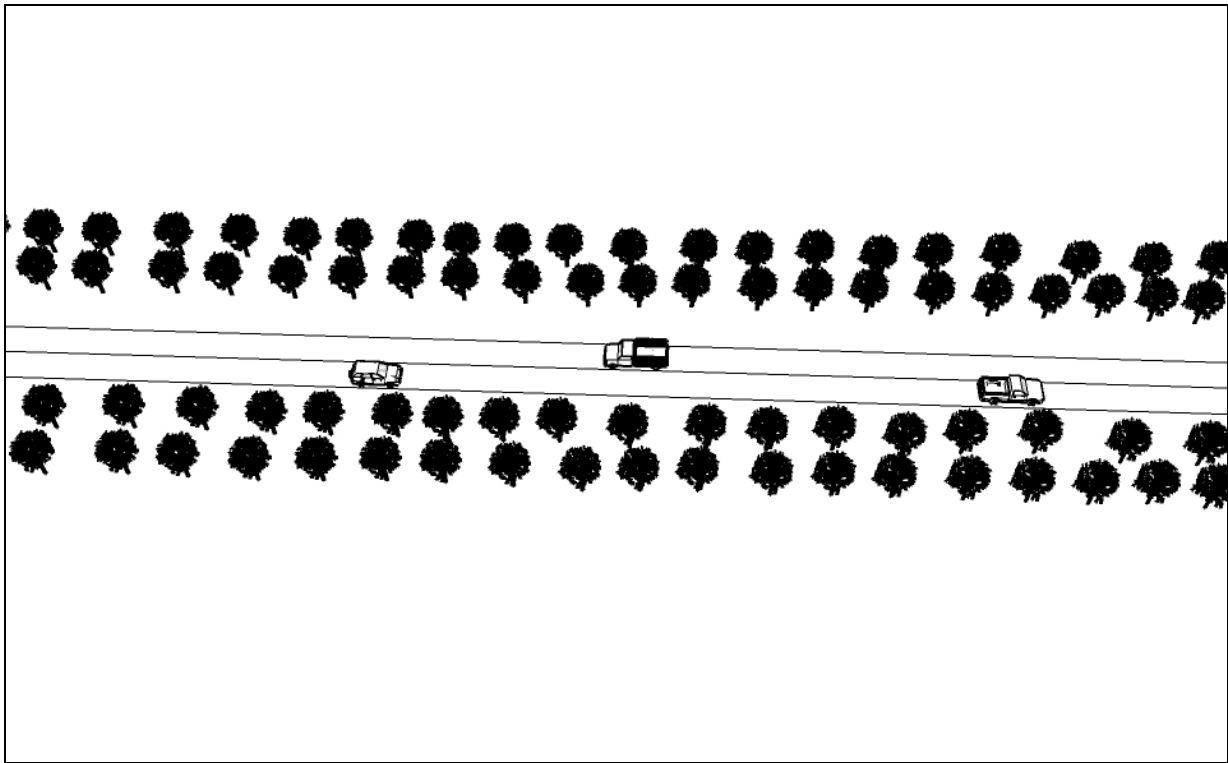


Figure 6: A double line of trees indicates location of future town center and multiway boulevard along rural two-lane Liberty Parkway today

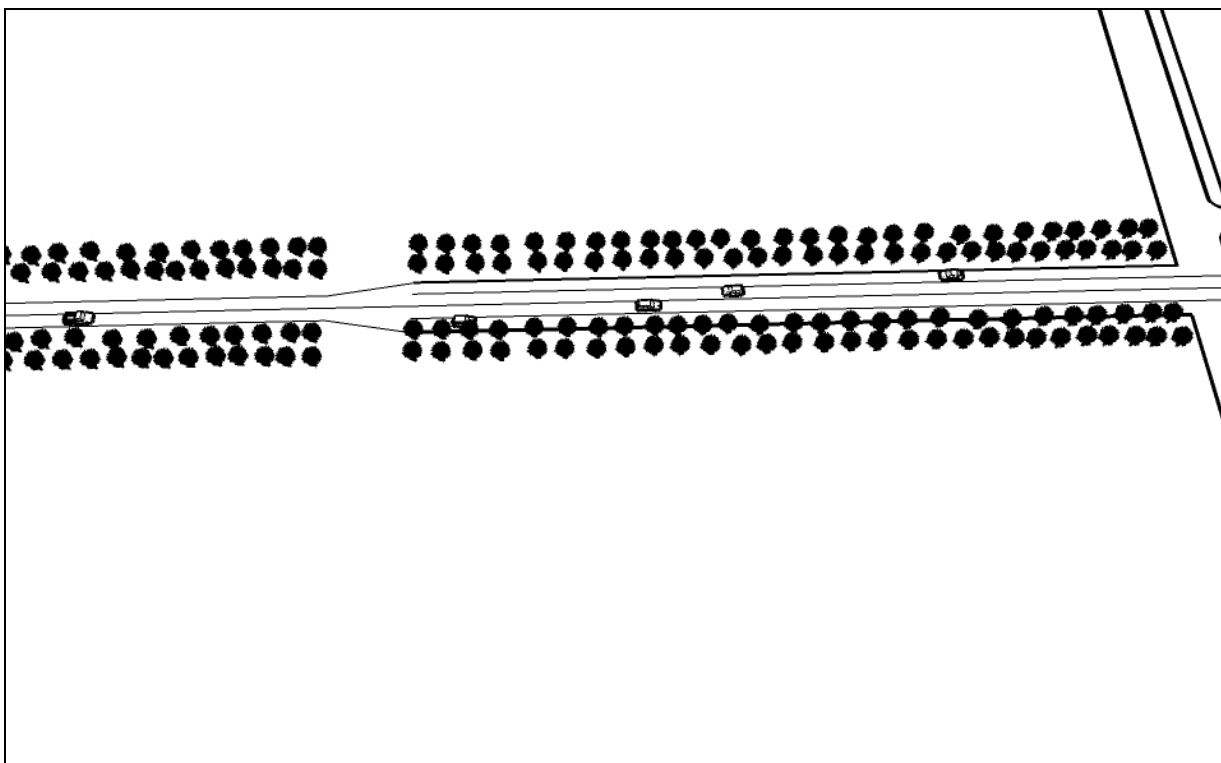


Figure 7: As Liberty Parkway approaches a town center or as a town center is constructed, Liberty Parkway widens to four lanes. Trees start to become pedestrian-realms medians.

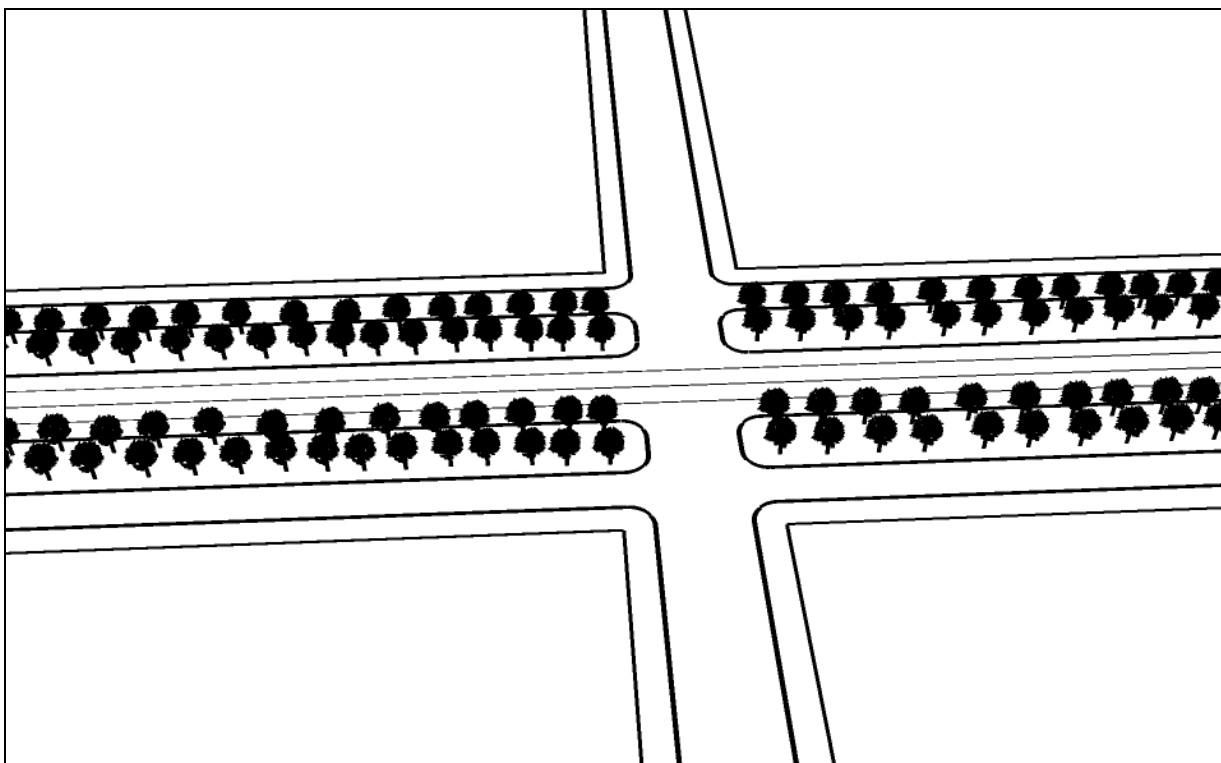


Figure 8: The median curb and gutter and one-way access lanes are added, creating the basic block structure of the town center multiway boulevard

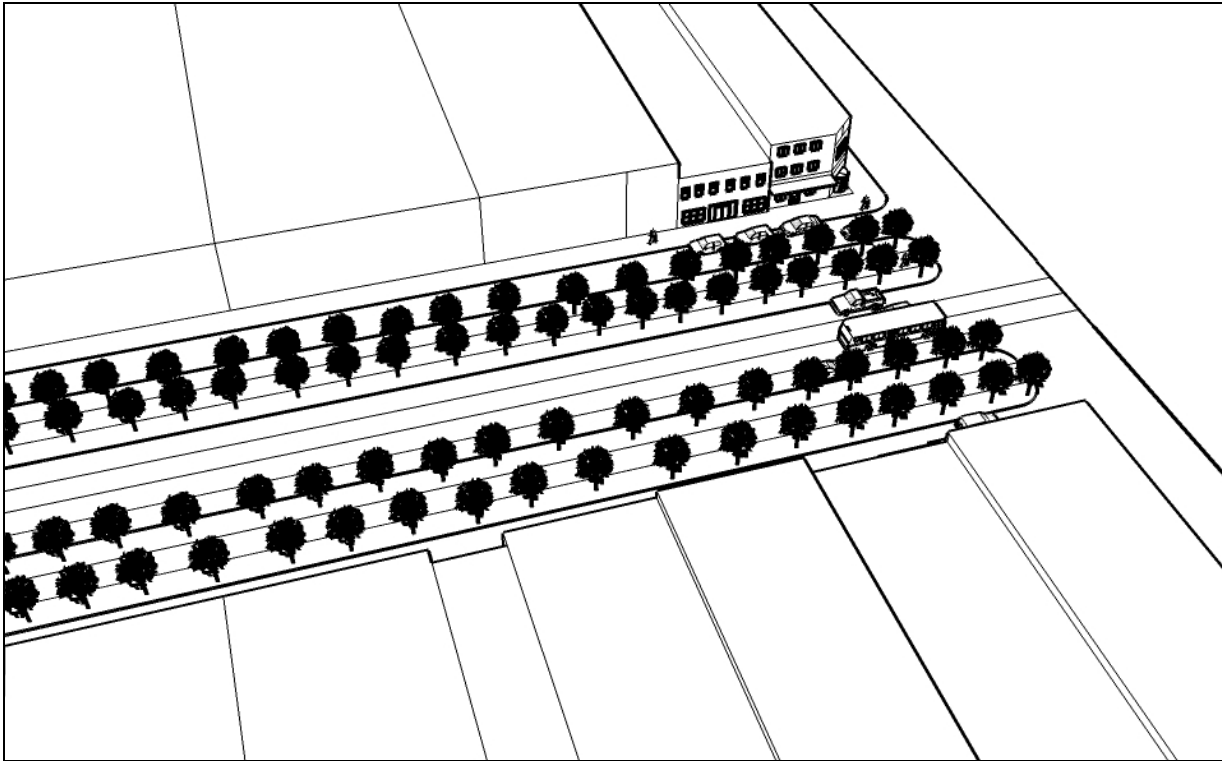


Figure 9: Buildings are constructed along the one-way access lanes, and the town center multiway boulevard is complete

APPENDIX B:

SOUTH LIBERTY PARKWAY - PHASE 2

DESIGN CRITERIA

South Liberty Parkway Phase II Liberty, Missouri

DESIGN CRITERIA

**Prepared by HNTB Corporation
October 20, 2004**

Design Guidelines and References:

- ❑ City of Liberty, "Technical Specification and Design Criteria for Public Improvement Projects." 2000.
- ❑ City of Liberty, Standard Details. 2000.
- ❑ Kansas City Metropolitan Chapter, "American Public Works Association Standard Specifications and Design Criteria." 1990.
- ❑ Missouri Department of Transportation, "Missouri Standard Specifications for Highway Construction." January, 2000.
- ❑ Missouri Department of Transportation, "Missouri Department of Transportation Bridge Manual." May 18, 2000.
- ❑ American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets and Roadside Design Guide, 4th Edition. 2001.
- ❑ U.S. Department of Transportation, Manual on Uniform Traffic Control Devices (MUTCD). December 2000.

Roadway Design Criteria:

	<u>S. Liberty Pkwy.</u>	<u>Sidestreet</u>	<u>TND Mainline</u>	<u>TND Sidestreet</u>
Classification:	Major Arterial	Minor Arterial	Boulevard	2-Lane Local
Design Speed:	50 mph	35 mph	30-35 mph	25-30 mph
Posted Speed:	45 mph	35 mph	30 mph	25 mph
Right-of-Way Width:	120 ft.	80 ft.	150 ft.	60 ft.
Typical Section				
Lanes:	4	4	4	2
Street Width:	58 ft. Back-to-Back	48 ft. Back to Back	26 ft. Back to Back	24 ft. Back to Back
Lane Width:	11 ft.	11 ft.	10 ft.	10 ft.
Median:	6 ft. Back to Back	N/A	6 ft. Back to Back	N/A
Sidewalk Width:	5 ft.	5 ft.	8 ft.	5 ft.
Hike Trail Width:	8 ft. Asphalt	N/A	N/A	N/A
Pavement X-Slope:	2.00%	2.00%	2.00%	2.00%
Outside Curb Type:	Barrier	Barrier	Barrier	Barrier
Side Slopes:	4:1 Desirable; 3:1 Max.	4:1 Desirable; 3:1 Max.	6:1 Desirable; 3:1 Max.	6:1 Desirable; 3:1 Max.
Pavement Section:	1.5" type 3 asphaltic concrete surface	1.5" type 3 asphaltic concrete surface	1.5" type 3 asphaltic concrete surface	1.5" type 3 asphaltic concrete surface
	10.5" type 1 or 2 asphaltic concrete base	10.5" type 1 or 2 asphaltic concrete base	10.5" type 1 or 2 asphaltic concrete base	8.5" type 1 or 2 asphaltic concrete base
	6" compacted subgrade	6" compacted subgrade	6" compacted subgrade	6" compacted subgrade
Min. Horizontal Radii:	1300 ft.	700 ft.	300 ft.	185'
Maximum Grade:	6%	6%	8%	10%
Minimum Grade:	0.5%	0.5%	0.5%	0.5%
Curb Return Radius	50 ft.	50 ft.	50 ft.	25 ft.
Min. Stopping Sight Distance:	425 ft.	250 ft.	200 ft. - 250 ft.	155 ft. – 200 ft.
Sag Vertical Curve (K):	96(90-110)	49 (60-70)	50	30
Crest Vertical Curve (K):	84(110-150)	29 (60-80)	40 – 50	30
Intersection Sight Distance:	478 ft.	334 ft. - Right 412 ft. - Left	334 ft. – Right 386 ft. – Left	N/A N/A

Driveway Entrances:

Minimum Width:	10 ft.
Maximum Width:	24 ft.
Material	
Residential:	6 in. concrete to R/W match existing material beyond
Commercial:	7 in. concrete to R/W, match existing material beyond
Max. Grade:	10 % Desirable, 14 % Maximum
Max. Change In Grade	
Crest:	8%
Sag:	12%

Drainage Design Criteria:

<input type="checkbox"/> Hydrology Methods			
Less Than 100 Acres:			Rational Method ($Q=kCIA$)
More Than 100 Acres:			Unit Hydrograph Method (SCS)
<input type="checkbox"/> Inlet and Pipe Design			
Design Storm	Crossing major arterial:	50-yr	
	Other:	10-yr	
Allowable Spread			
Major and Minor Arterials:		12.5 ft. from face of curb	
Collectors:		10.5 ft. from face of curb	
Minimum Pipe Size:		15 in.	
Minimum Pipe Slope:		0.5%	
Type of Pipe:		CMP	
Minimum Pipe Velocity:		3.0 ft/s	
Maximum Pipe Velocity:		15.0 ft/s	
Maximum Outlet Velocity:		use APWA criteria, excluding grouted riprap	
Minimum Cover on Pipe:		18 in.	
Curb Inlet Type:		Liberty Standard Curb Inlet	
<input type="checkbox"/> Ditch Design			
Design Storm Frequency:		10-year	
Minimum Freeboard to Top of Bank:		1 ft.	
Minimum Slope:		1%	
Capacity Calculations:		Manning's Formula for uniform flow	
Channel Protection		Grass if $V < 5$ ft/s. Channel protection if $V \geq 5$ ft/s.	
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Clogging Factor:		20%	

Bridge Hydraulic Design (Use MoDOT Bridge Manual):

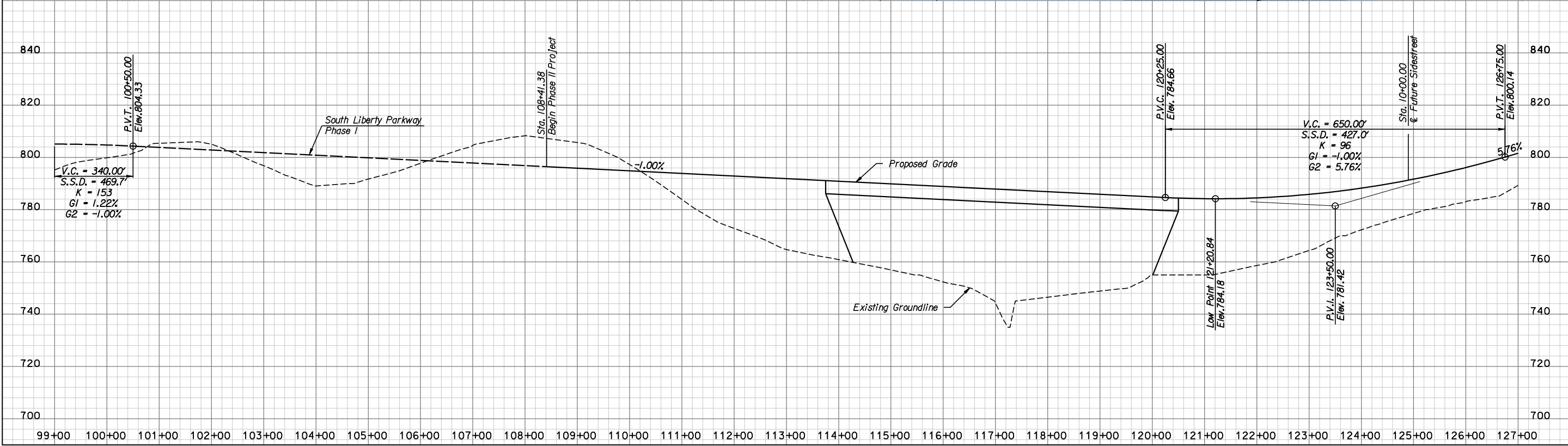
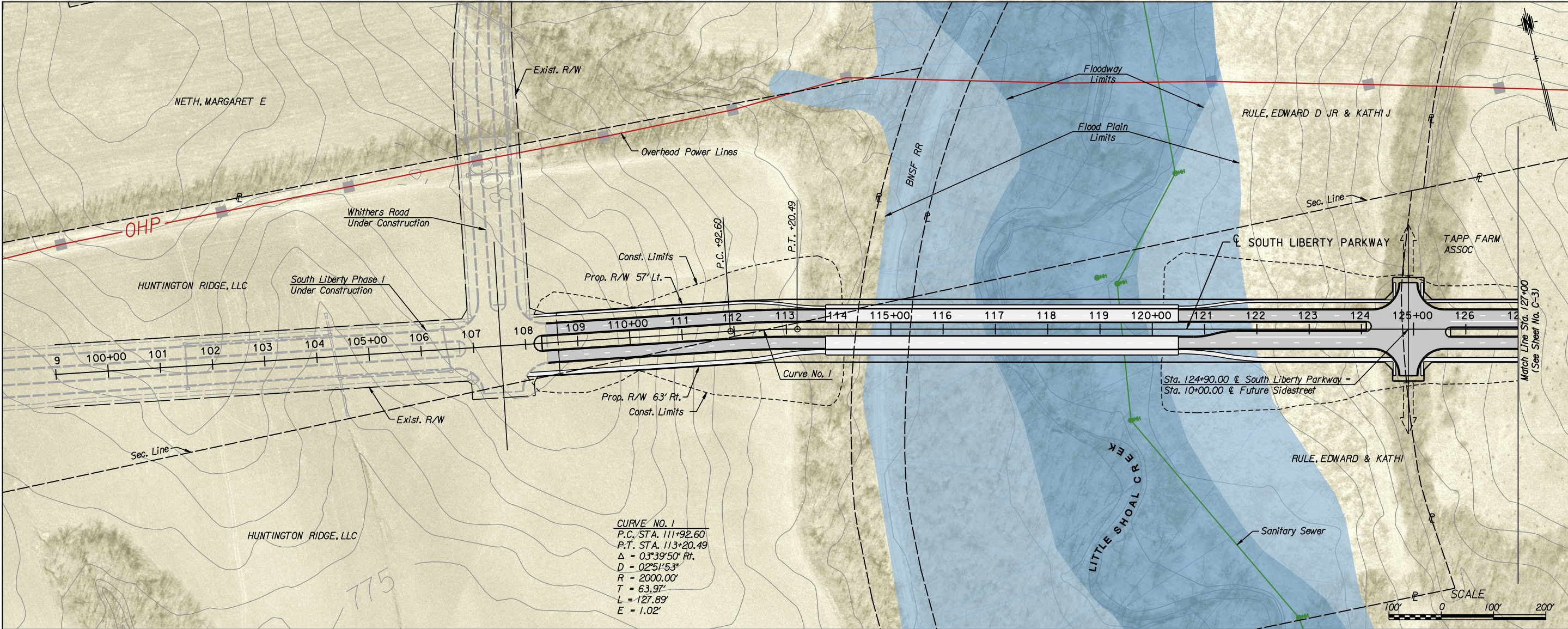
Design Frequency:	100-year, check 2, 5, 10, 25, 50, and 500-year
Hydrology:	Use Existing FEMA flows or Little Shoal Creek Study
Design Method:	HEC-RAS modeling
Freeboard from 100-yr Water Surface to Lower Limit of Superstructure:	1 ft.
Maximum Backwater:	0.00 ft. in 100-year (for Construction in Floodway) 1.00 ft. in 100-year (for Construction in Floodplain)
Roadway Overtopping:	0.00 ft. in 100-year
Average Velocity Through Bridge:	Approx. 6 ft/s
Scour Analysis:	100-year (500-year check)

APPENDIX C:

SOUTH LIBERTY PARKWAY - PHASE 2 CONCEPTUAL PLAN AND PROFILE PLATES

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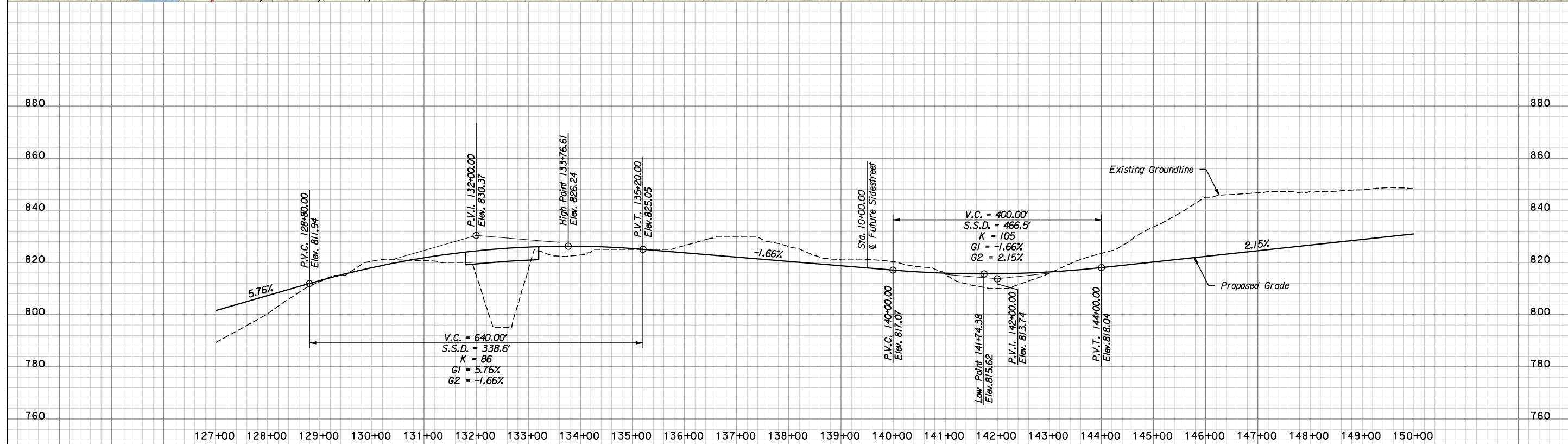
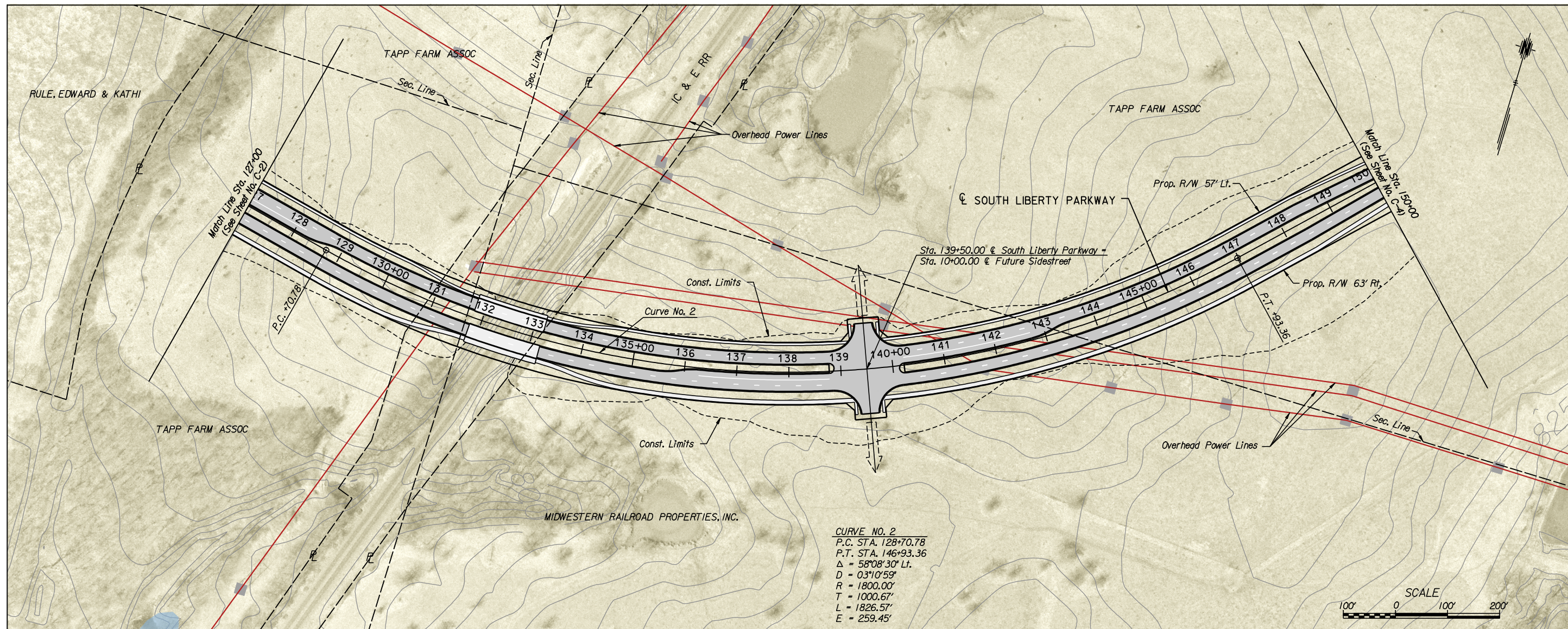
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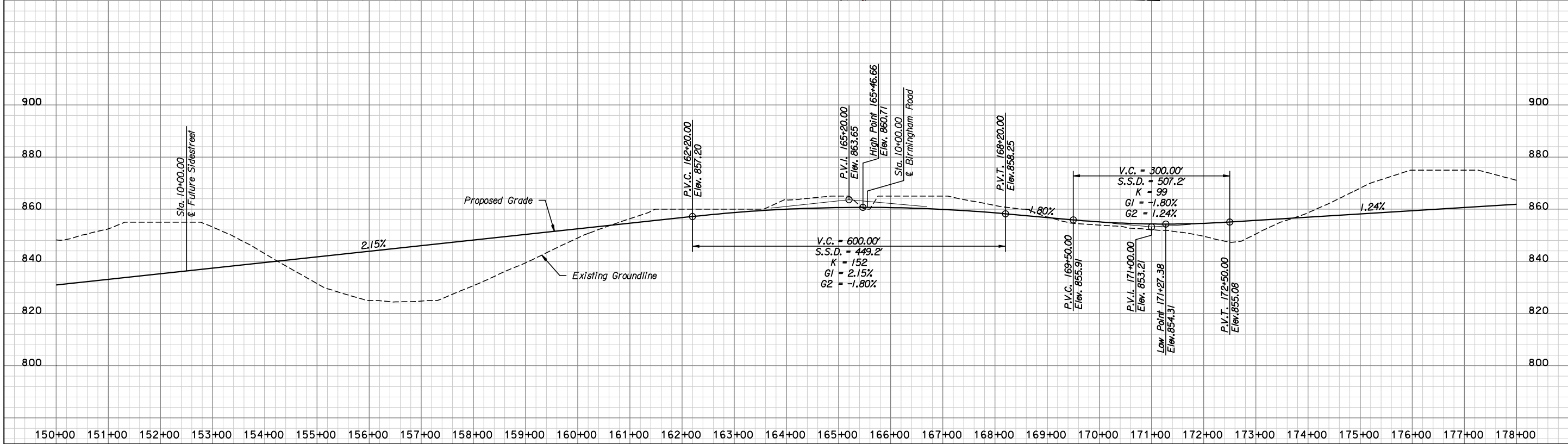
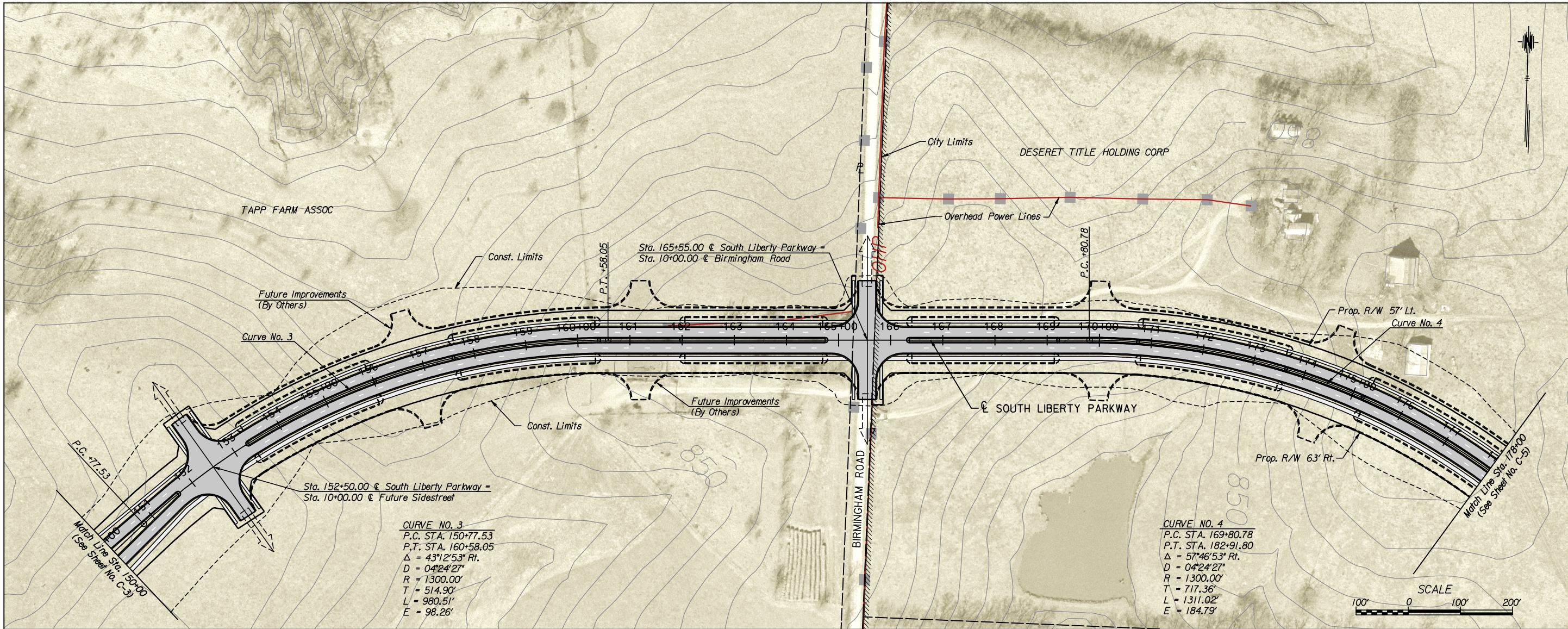
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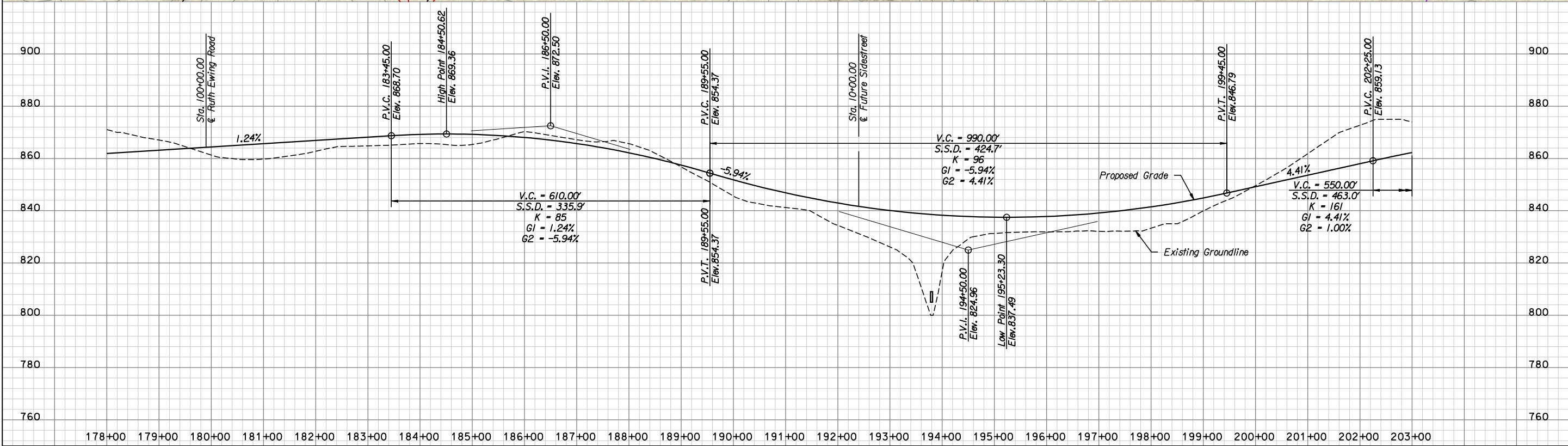
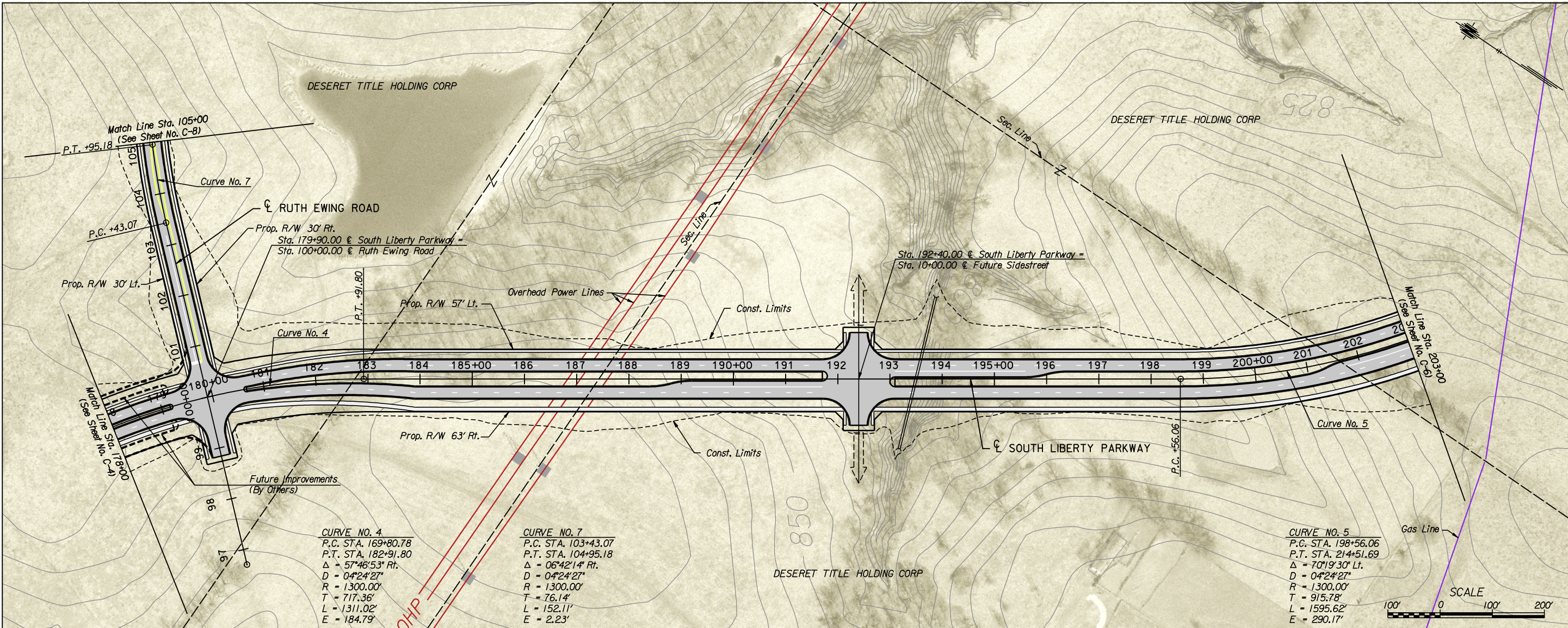
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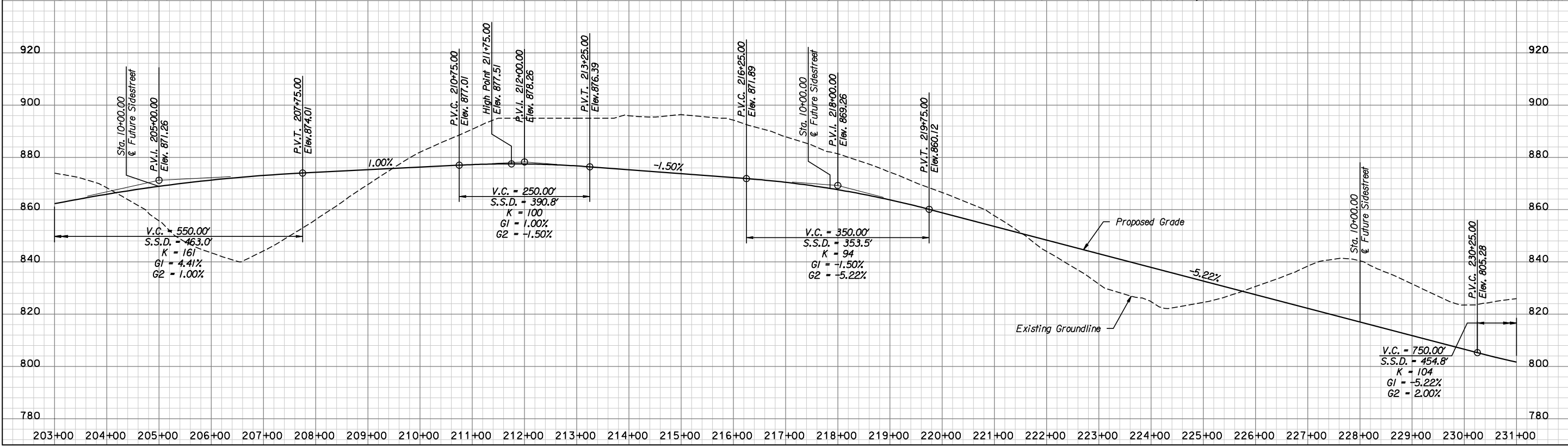
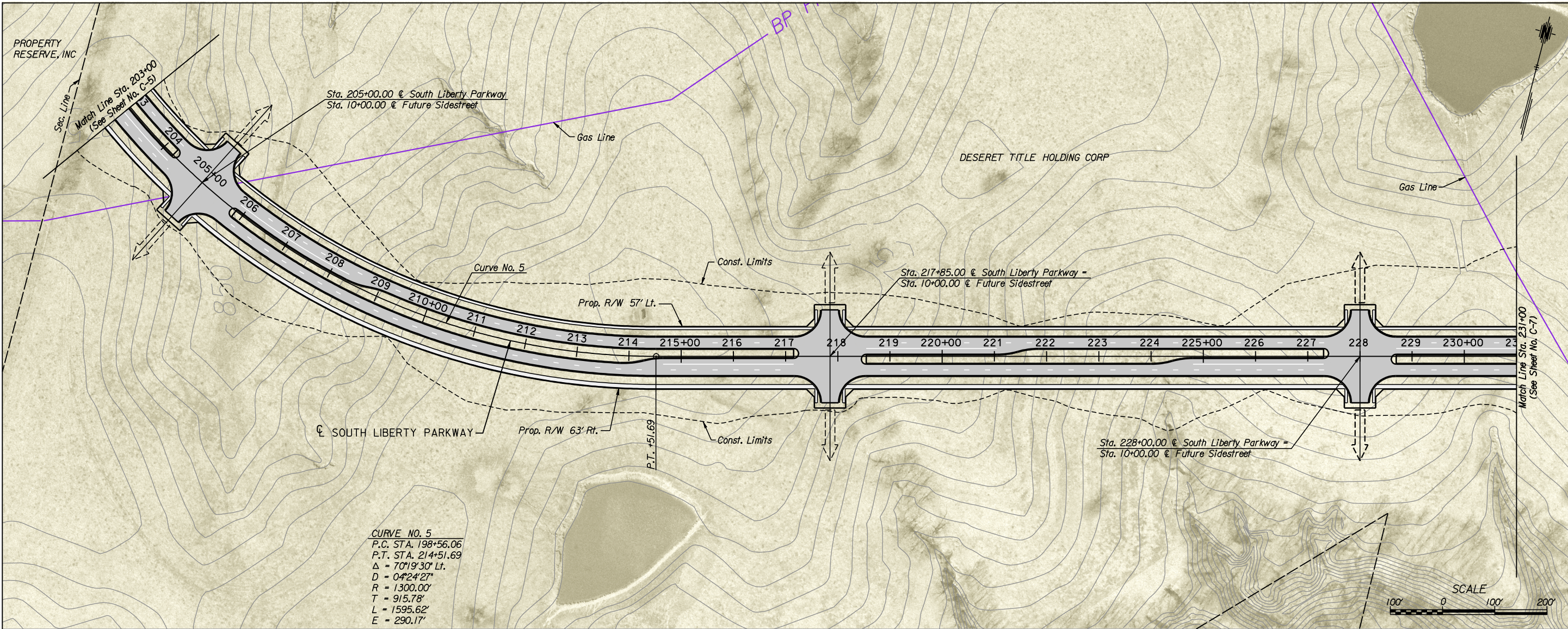
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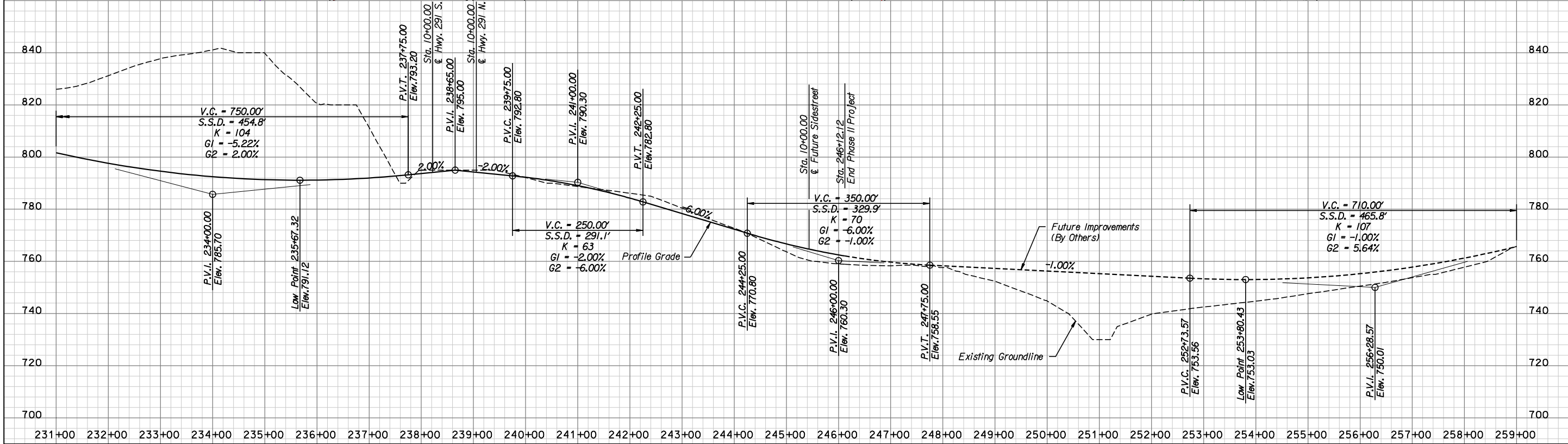
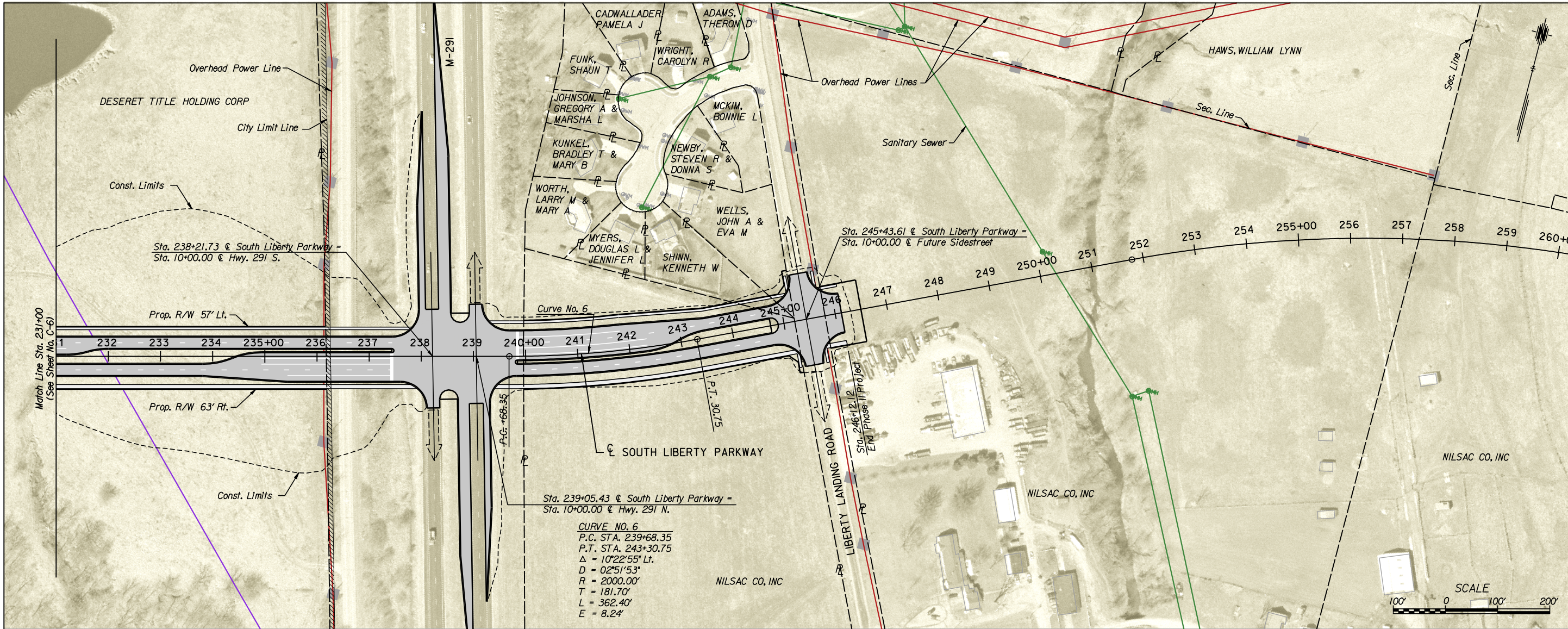
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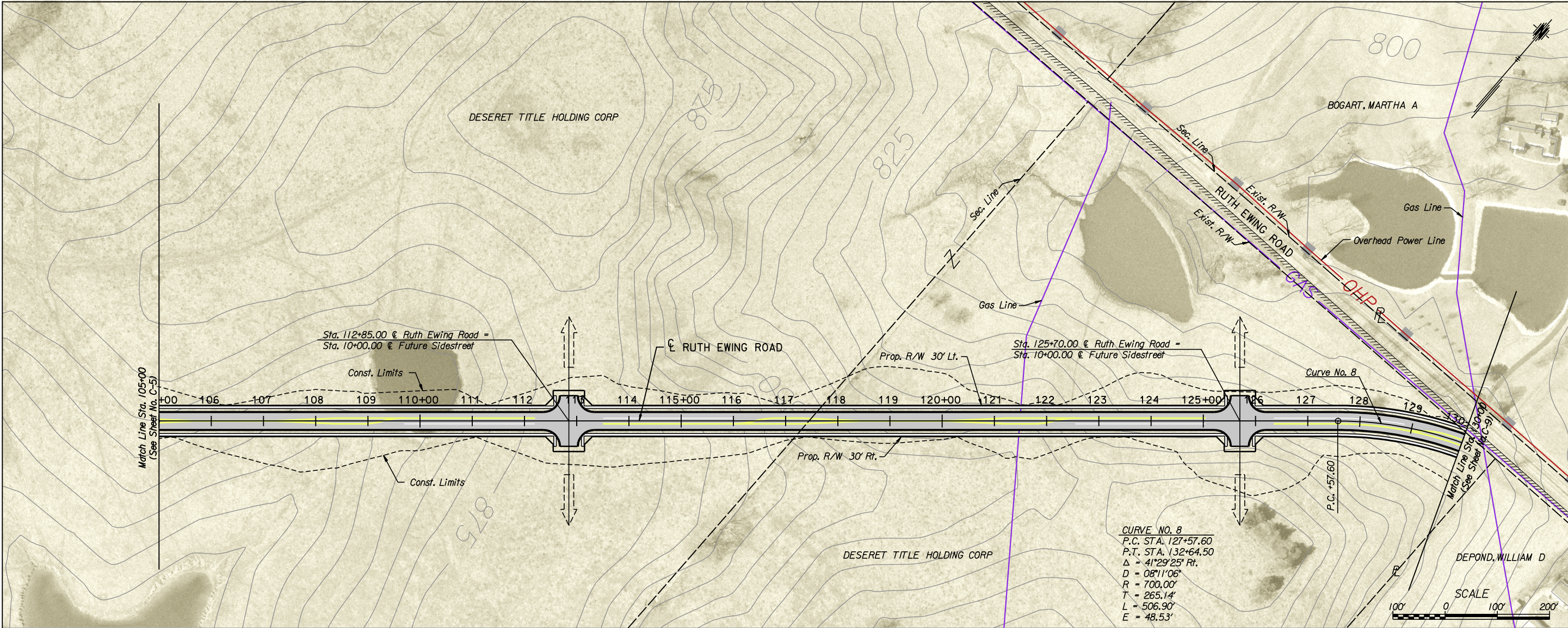
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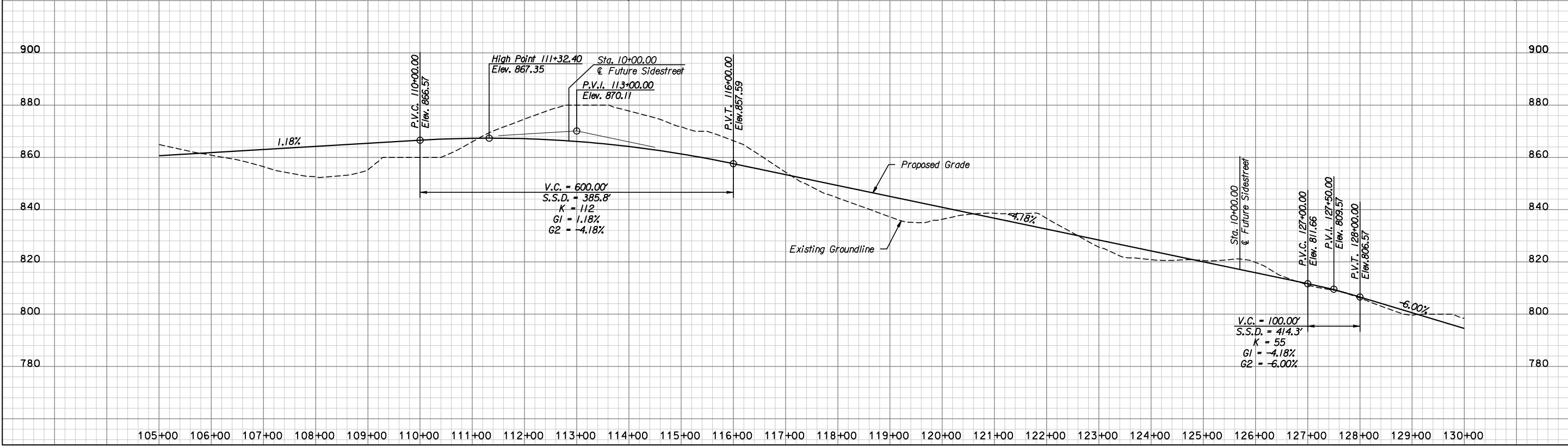
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Overland Park, KS 66213
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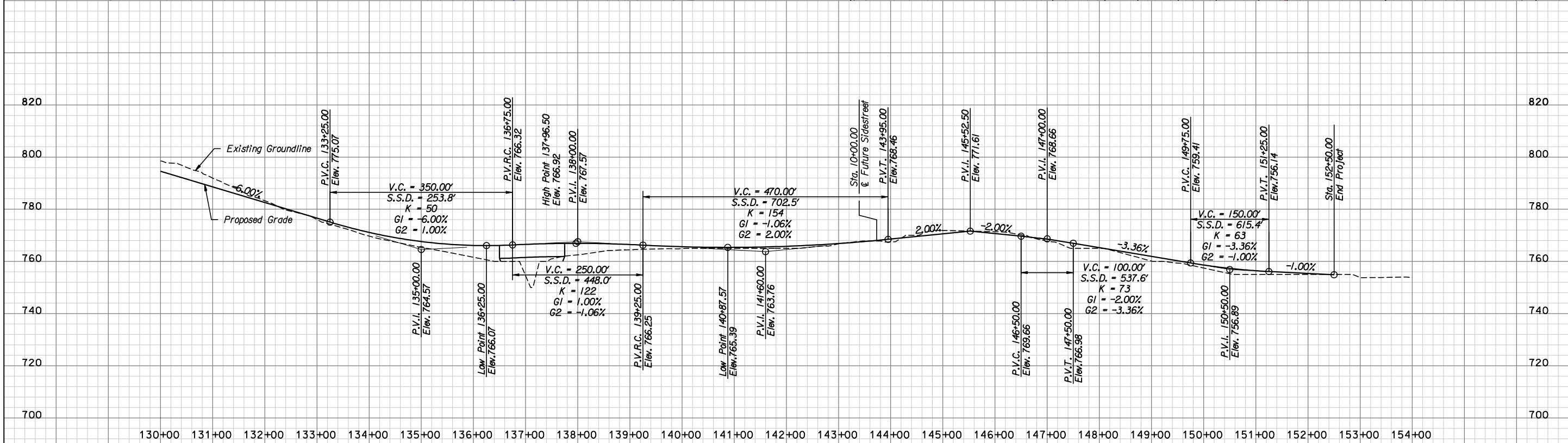
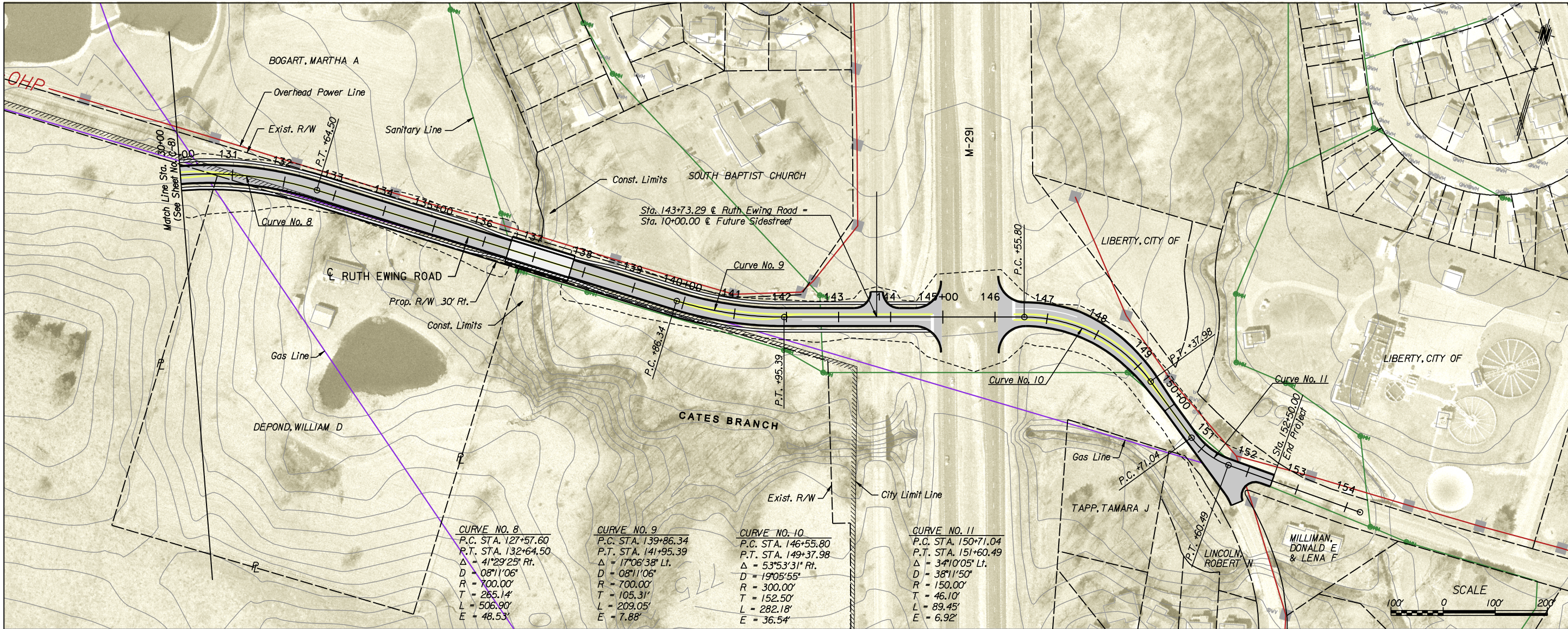
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7450 W 130th St, Suite 400

Overland Park, KS 66213

(913) 481-8833

HNTB

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REVISIONS

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APPENDIX D:

SOUTH LIBERTY PARKWAY CORRIDOR 2003 MARKET, DEMAND FORECASTS, AND VALUE CAPTURE ANALYSIS

Memorandum

Date: July 25, 2003
To: Kevin Wallace, HNTB
From: Economics Research Associates
RE: South Liberty Roadway Study - #14388
Regional Economic and Market Analysis

INTRODUCTION

Economics Research Associates (ERA) was retained by HNTB and the City of Liberty to assist in planning for new development around the South Liberty Roadway, a four-mile corridor that will connect Interstate Highway 35 with State Highway 291. The study will consist of two stages: a situation and market analysis (Stage I) and a financial and economic analysis of future growth scenarios (Stage II).

This memorandum summarizes the first part of Stage I, presenting the findings of a situation analysis of the region, the City of Liberty and the corridor, and outlining real estate market supply trends in the Liberty area. In the later phases of this stage, the findings of this memorandum report will be used to inform projections of future growth by land use type within the South Liberty Roadway corridor.

Stage II will provide the basis for the projection of potential value capture and supportable capital development costs. It will use these projections to analyze the implications for value capture strategies and will address development economics and supportable land values; magnitude of future value growth; and supportable bonded debt.

DEMOGRAPHIC AND ECONOMIC OVERVIEW

ERA has analyzed demographic and economic conditions in the City of Liberty, Clay County, and the Kansas City MSA. The City of Liberty is located fifteen miles northeast of Downtown Kansas City and is the county seat of Clay County. Clay County is one of fifteen counties that make up the Kansas City metropolitan area. Factors considered include population, households, employment, income levels, retail business spending patterns, and other related indices. Variables that affect demand for various real estate opportunities, including employment growth

distribution, forecasts by employment category and economic sector, and the changing composition of the regional economy are discussed as well.

Population

The table below shows population estimates for the City, County and MSA. As shown, the region experienced a population increase of about 10 percent between 1990 and 2000. The City of Liberty and Clay County grew significantly faster than the rest of the region: 28 percent and 20 percent, respectively, compared with 11 percent for the MSA as a whole. These increases are consistent with the previous two decades, as between 1970 and 1980, the City of Liberty's population increased nearly 20 percent and between 1980 and 1990, it increased approximately 26 percent. Liberty's population forecast for 2010 is 35,000, representing a growth rate of 33.4 percent from 2000 to 2010, or three percent annually. If population does grow at this rate, significant new demand will be created for new housing and retail space in the City.

Table 1. 1990 and 2000 City, County and MSA Population

Population	1990	2000	90-00 % Change
City of Liberty	20,500	26,230	28.0%
Clay County	154,160	185,640	20.4%
Kansas City MSA	1,587,100	1,755,900	10.6%

Source: City of Liberty, Clay County, US Census Bureau

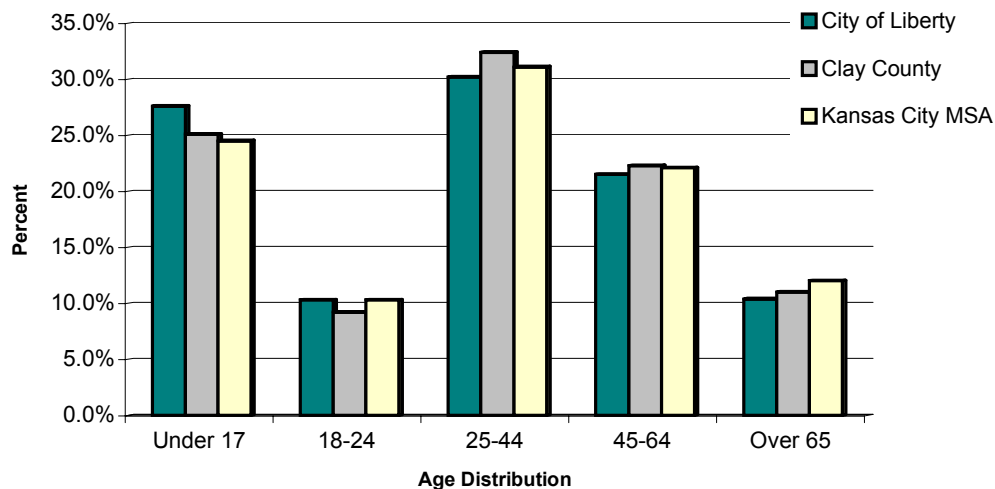
The population distribution by age is almost identical for Clay County and the Kansas City MSA, similar to that of the U.S. Liberty has a smaller percentage of its population in the 45 years and older age category compared to the county and MSA. The median-age for Liberty is 33.9 and for Kansas City MSA is 35.4. Liberty's concentration of children under 18 (28 percent) is much higher than the county and MSA (both at 25 percent). A concentration in the younger age group implies demand for recreational/entertainment uses and the starter home market. The table below and the chart on the following page show the population distribution for each area.

Table 2. 2000 Population Distribution by Age

Age Distribution	City of Liberty	Clay County	Kansas City MSA
Under 17	27.6%	25.1%	24.5%
18-24	10.3%	9.2%	10.3%
25-44	30.2%	32.4%	31.1%
45-64	21.5%	22.3%	22.1%
Over 65	10.4%	11.0%	12.0%

Source: City of Liberty, Clay County, US Census Bureau

Chart 1. 2000 Population Distribution by Age



Households

Between 1990 and 2000, the City of Liberty experienced a 24.4 percent increase in households, compared with 23.0 percent for Clay County, and 12.9 percent for the Kansas City MSA. The City of Liberty's average number of people per household figure of 2.62 exceeds the regional average of 2.46. Liberty's average household size has been increasing since 1990, contrary to regional and national trends.

Table 3. 2000 City, County and MSA Households and Average Household Size

Population	Households	Average HH Size
City of Liberty	9,510	2.62
Clay County	72,560	2.50
Kansas City MSA	426,760	2.46

Source: US Census Bureau

Housing Characteristics

Liberty has a predominantly detached single-family housing stock, with less than 24 percent of the units being of the attached single-family or multi-family varieties. Since 1987, no new apartments have been constructed, and as a result the proportion of multi-family units in the city has decreased. Close to 74 percent of the units are owner-occupied, a greater proportion than the county (70.7 percent) and MSA's (66.7 percent) rates. The table on the next page shows the total housing units, occupancy rates and percent of owner-occupied units for the city, county and MSA.

Table 4. 2000 Housing Units and Occupancy Rates

	Housing Units	Occupancy Rate	% Owner Occupied
City of Liberty	9,973	95.4%	73.5%
Clay County	76,230	95.2%	70.7%
Kansas City MSA	457,995	93.2%	66.7%

Source: US Census Bureau

Between 1980 and 1990, the median housing value in Liberty increased by 55 percent, from \$48,900 to \$75,800. In 1999, the average sale price of all houses sold in Liberty was \$136,000 and the houses were on the market an average of 77 days. The average price of a new home is far lower than the overall average sale price at \$112,000. In the year 2000, 208 single-family building permits were issued. Liberty's median housing value is about 11 percent higher than the county's.

Income

According to census data, the City of Liberty's average household income increased from \$44,265 to \$62,994 during the 1990s, showing substantially higher incomes than either the Kansas City MSA or Clay County, but with a slower rate of growth than these other areas. Per capital income, on the other hand, shows a consistent pattern across the city, the county, and the metro area, indicating a concentration of more affluent, but larger households in Liberty. This variable reflects the kind of fast-growing, family oriented area reflected in other data, and should indicate increased pressure for development.

Table 5. 1990 and 2000 Income Statistics

Area	Average Household Income			Median Household Income			Per Capita Income		
	1990	2000	% change	1990	2000	% change	1990	2000	% change
City of Liberty	\$44,265	\$62,994	30%	\$36,388	\$52,745	31%	\$15,873	\$23,415	32%
Clay County	\$39,720	\$58,139	32%	\$34,370	\$48,347	29%	\$15,369	\$23,144	34%
Kansas City MSA	\$38,701	\$58,878	34%	\$31,613	\$46,193	32%	\$15,067	\$23,326	35%

Source: US Census Bureau

Labor Force and Employment

The labor force includes all residents 16 years of age and older who work or are actively seeking employment. In 2000, of the 109,830 persons in Clay County's labor force, 107,434 were employed, which yields an unemployment rate of 2.2 percent, compared to the state unemployment rate of 4.2 percent. This very low

unemployment rate in Clay County suggests that a lack of available labor may be hindering the county's growth. The unemployment rate for the MSA in 2000 was 3.3 percent and in 2001 was 3.9 percent. The following table shows the distribution of employment by industry for the city, county, and MSA.

Table 6. 1999 Percent Full- and Part-Time Employment by Industry

	Liberty	Clay County	Kansas City MSA
Agriculture	-	1.0%	1.0%
Construction & Mining	5.5%	5.4%	6.1%
Manufacturing	31.0%	15.5%	9.3%
Trans., Comm. & Utilities	4.1%	4.8%	7.6%
Wholesale	13.2%	7.7%	6.0%
Retail	12.7%	19.8%	16.7%
Finan., Ins., Real Estate	3.1%	5.7%	9.2%
Services	29.8%	28.9%	31.5%
Government	-	11.5%	12.6%

Source: Bureau of Economic Analysis

Table 7. 1999 Total Full- and Part-Time Employment by Industry

	Clay County	Kansas City MSA
Agriculture	789	9,268
Construction & Mining	5,798	72,087
Manufacturing	16,651	109,484
Trans., Comm. & Utilities	5,153	89,524
Wholesale	8,314	70,510
Retail	21,314	196,436
Finan., Ins., Real Estate	6,182	107,775
Services	31,092	369,876
Government	12,384	147,955
Total Non-farm Employment	107,677	1,172,915

Source: Bureau of Economic Analysis

The manufacturing industry produces over 30 percent of jobs in the City of Liberty, more than twice the percentage in Clay County, and more than three times that of the MSA. Hallmark employs about 1,500 and an additional 1,200 employees work in the industrial park. Additionally, the Ford Motor Company's manufacturing facility, the county's largest employer with 5,500 jobs, is located just outside of Liberty in the city of Claycomo. For the county and MSA, the largest percentage of employees is in the Services sector, which is the second largest employment sector for the city. The following two tables list Liberty's and Clay County's largest employers.

*Table 8. Liberty's Major Employers**

Employer	# of Employees
Hallmark Distribution Center	1,486
Liberty Hospital	1,038
Liberty School District	760
Clay County	482
William Jewell College	425
Banta Publications	410
Price Chopper	405
City of Liberty	263
Ferrell Companies	256

** figures include full- and part-time employees*

Source: Liberty Chamber of Commerce

Table 9. Clay County's Major Employers

Employer	# of Employees
Ford Motor Company	5,500
Cerner Corporation Headquarters	3,000
Harrah's North Kansas City Casino	2,500
North Kansas City Hospital	2,200
Station Casino	2,000
North Kansas City School District	1,800
Farmland Industries, Inc. Headquarters	1,800
Worlds of Fun/Oceans of Fun Theme Parks	1,500
Hallmark Distribution Center	1,500
Liberty Hospital	1,200

Source: Clay County Economic Development Council

Retail Market and Spending

Liberty's retail inventory is comprised of the 75 businesses located in its historic downtown area as well as six shopping centers, which contain over 700,000 square feet of retail space. There are two major grocery stores that serve the residents of Liberty. Annual retail spending in 1999 for Liberty was estimated to be \$293 million. Retail sales in 1997 for the whole county were \$2.5 billion and per capita spending was \$14,230. Liberty's share of total county spending is about 12 percent.

The table below shows the retail spending per category for Clay County.

Table 10. Clay County Retail Sales

	1990	2000	% Change
Total Retail Sales (Mill. 1992 \$)	\$91.56	\$108.02	18.0%
Building Materials, Hardware .	\$5.18	\$6.46	24.7%
General Merchandise	\$14.71	\$21.29	44.7%
Food Stores	\$25.75	\$25.01	-2.9%
Automobile Dealers	\$20.33	\$26.52	30.4%
Gasoline Service Stations	\$5.65	\$4.45	-21.2%
Apparel And Accessories	\$1.88	\$2.11	12.2%
Furniture, Home Furnishings ..	\$2.83	\$4.26	50.5%
Eating And Drinking Places ...	\$6.44	\$8.15	26.6%
Drug Stores	\$4.21	\$5.69	35.2%
Miscellaneous Retail Stores ..	\$4.58	\$4.09	-10.7%

Source: Woods and Poole Economics

TRANSPORTATION, ACCESS, AND CAPITAL IMPROVMENTS

The South Liberty Roadway study area is mostly undeveloped open space at the present time. The only existing developments in the corridor are several houses along Ruth Ewing Road and Withers Road and a few establishments along Liberty Drive. Institutional facilities include the Immacolata Manor, The Cedars of Liberty Retirement Center and Our Lady of Mercy Country House. Though currently developed as a lower-density area, there are residential projects in Pleasant Valley, Glenaire, which is almost fully developed, and Southland Estates adjacent to State Highway 291 at Ruth Ewing Road. There are thirty-two property owners immediately on the proposed roadway or adjacent to those properties that will be directly impacted by the construction of the project. Sixteen of these property owners have parcels ranging between 30 and 770 acres.

Interstate Highway 35, U.S. 69, Liberty Drive, and State Highway 291 have the highest traffic volumes in the area. Average 2000 daily traffic volumes on Interstate Highway 35 and State Highway 291 were 56,052 and 22,562, respectively. Hughes, Withers, and Birmingham Roads provide north-south access in the corridor, and Ruth Ewing Road and Liberty Drive provide east-west access. The proposed South Liberty Roadway is a four-mile east-west thoroughfare connecting Interstate Highway 35 to State Highway 291. Most of the roadway will be within the corporate limits of the City of Liberty, with portions in unincorporated areas of Clay County.

In addition to the proposed South Liberty Roadway, other major capital improvement plans include the Interstate Highway 35/State Highway 152 interchange project and the expansion of the city's water treatment plant. The

Interstate Highway 35/State Highway 152 interchange project consists of bridge widening, lane improvements, some new city road construction, and reconfiguration of city roads. These improvements will impact commercial activity, since it will open accessibility to new sites in an area where there is very little retail availability.

The South Liberty Roadway is anticipated to create significant economic benefits for the Liberty area, both in the short and long term. In the short term, many construction jobs will be created, to build the road itself, and also to build new housing and commercial developments expected to occur as a result of the new road (see market supply piece for further explanation). The associated earnings from the jobs and new households will generate a great deal of new revenues for the City of Liberty and Clay County, in the form of income, property, business, and sales taxes.

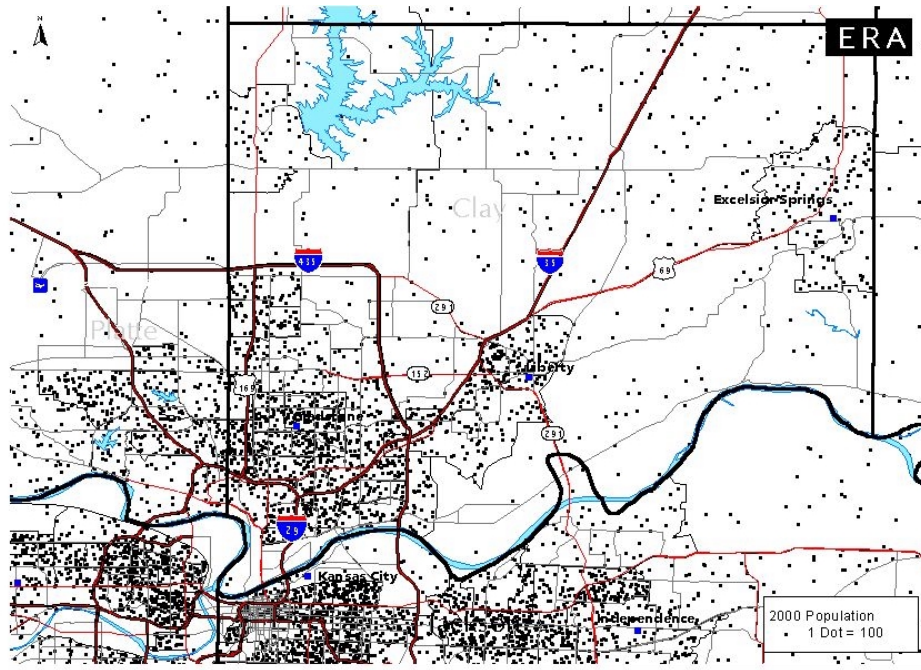
RESIDENTIAL DENSITY AND INCOME DISTRIBUTION

The City of Liberty, as stated previously, is in the northeastern suburbs of Kansas City. Although it is in the center of Clay County, Liberty is the outermost pocket of residential density of the metro area in the Interstate 35 corridor, with the rest of the county still largely rural in character.

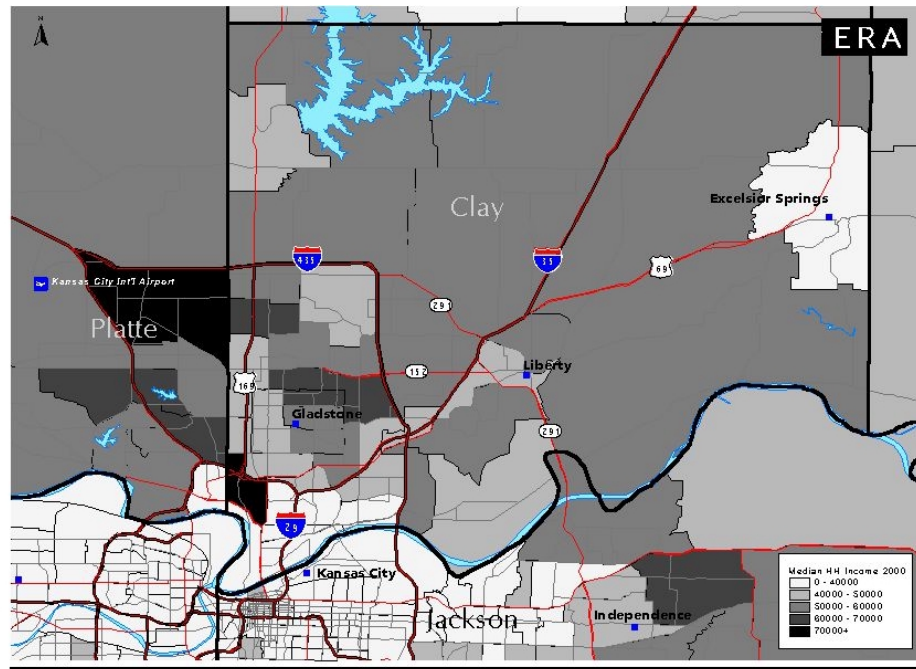
Looking at the whole Northland, Liberty forms the eastern edge of the developed area, and it is connected to the other portions of the Northland by three highway corridors: I-435, Route 152, and I-35/I-29 corridor. The maps on the following pages illustrate the demographics of this area. Map 1 shows how population density is higher in these corridors than in other “in between” areas. Map 2 shows that the higher-income areas in the Northland are along these three major roads. Map 3 shows concentrations of owner-occupied housing, illustrating how Liberty compares mostly favorably with the rest of the Northland.

Generally speaking, Liberty is fairly densely populated, although not as dense as the area inside the I-435 loop. Liberty’s income levels trail other parts of the Northland area. The South Liberty census tract has a higher median household income level (\$50,000-60,000 range) than does the central Liberty tract (\$40,000-50,000 range), but trails most of the census tracts located along the three major corridors, many of which have median household income levels over \$70,000. On the whole, income levels in the Northland far exceed those in the central part of Kansas City, where most Census tracts have median income levels below \$40,000. Regarding owner occupancy, south Liberty’s owner occupancy percentage is fairly high (over 80 percent), but central Liberty is lower (between 70-80 percent). Many other tracts in the Northland exceed 90 percent owner occupancy.

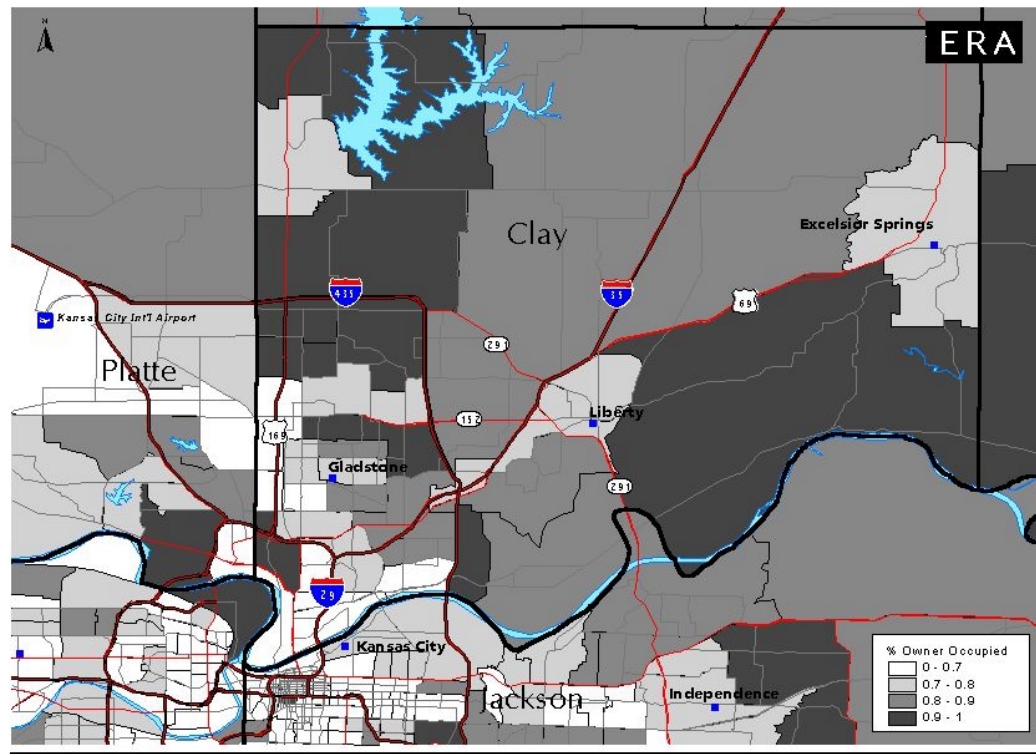
Map 1: Population Density in the Northland Area



Map 2: Median Household Income by Census Tract in the Northland Area



Map 3: Owner Occupancy Levels by Census Tract in the Northland Area



2000 - Percent Owner Occupied Housing by Census Tract

COMMERCIAL REAL ESTATE MARKET SUPPLY TRENDS

Retail Market

Cohen-Esrey Real Estate Service's most recent report includes performance through the first half of 2001. In total, the regional retail market contains 47.89 million square feet of space, of which 4.07 million, or 8.5 percent, was available as of June 2001. This vacancy rate is the region's highest in five years, surpassing the year-end 1999 rate of 8.13 percent. This rise in vacancy is not alarming, as vacancy has remained relatively steady over the past five years, never dipping below 7.5 percent.

Both the construction and absorption of retail space have rebounded in the past two years at the regional level, after falling off substantially from 1995 through 1999. Construction starts fell each year during that period, from a high of 4.6 million square feet in 1995 to just 1.9 million square feet in 1999. However, 2000 saw a leap up to 3.7 million square feet of construction starts, and over 2.1 million more during first six months of 2001 alone. Similarly, net absorption fell gradually from 4.3 million square feet in 1995 to 1.7 million square feet in 1999, before recovering. From January to June 2001 alone, the regional retail market absorbed 1.65 million square feet of retail space, which would project to 3.3 million square feet for a whole year.

Cohen-Esrey's report divides the Kansas City metro area into 10 market areas, ranging in size from 8.0 million square feet to 1.2 million square feet. The Kansas City North Area is the region's second largest market area, as it contains 7.46 million square feet of retail space (15.6 percent of the regional total). Of this amount, about 567,000 square feet were vacant (7.6 percent). Counter to the regional trend, this vacancy rate is down considerably from the December 1999 rate of 10.4 percent.

The Kansas City North Area contains three sectors. Sector 3, which contains Liberty, is the smallest of the three, with just 1.24 million square feet. Vacancy in Sector 3 is minimal, as just 76,000 square feet (6.1 percent) were available as of June 2001. This rate is down drastically from 1999, when it reached as high as 15.0 percent. The following table compares the Liberty Sector, the Kansas City North Area, and the entire region's retail markets.

Table 11. Kansas City Metro Area Retail Market Profile, June 2001

	Total SF in Area	Vacancy Rate				
		Jun-01	Dec-00	Dec-99	Dec-98	Dec-97
Liberty Sector	1,239,550	6.1%	7.1%	15.0%	12.5%	8.3%
Total KC North Area	7,462,470	7.6%	7.2%	10.4%	9.2%	6.9%
Regional Total	47,887,491	8.5%	8.0%	8.1%	7.9%	7.6%

Source: Cohen-Esrey Real Estate Services, Inc.

Lease rates in the Kansas City North Area are reasonably competitive, with a median asking rate of \$11 per square foot, and the top of its range at \$21. Among suburban markets, only South Johnson County has markedly higher rental rates for retail space.

Colliers Turley Martin Tucker reports that Kansas City's retail market is seeing an enormous infusion of big-box retail development, driven by tenants like home improvement stores (Lowe's, Home Depot), discount department stores (Wal-Mart, Target), wholesale clubs (Costco, Sam's Club), and other large-format stores (Dick's Sporting Goods, Best Buy, Kohl's, etc.).

The Northland submarket has led the region in such development, with three such centers under construction as of January 2001. The Northland's retail development is concentrated in the Barry Road corridor, which runs more than ten miles from Interstate 29 near the Kansas City International Airport all the way to Interstate 35 in Liberty. There are three major big box developments under construction—Barry North Center at the I-29/Barry Road interchange, Barry Towne Center at the U.S. 169/Barry Road interchange, and Block & Company's Liberty Town Center at the interchange of I-35 and Highway 152. The Liberty development, which despite its name is actually outside the city's boundary, will contain over 500,000 square feet of space when completed. This area forms a substantial retail concentration that reflects the rapid growth of the City of Liberty and the surrounding areas.

Office Market

According to Cohen-Esrey's June 2001 report, the Kansas City metropolitan area contains a total of 38.3 million square feet of multi-tenant office space in nine submarket areas (the competing Colliers Turley Martin report showed 37.6 million square feet in the regional office market at the end of 2000). The Northland submarket, which includes Clay and Platte Counties, is the second smallest office submarket in the region, with just 2.00 million square feet of space, or about 5.2 percent of the regional total. The overall vacancy rate of the regional office market as of June 2001 was 13.0 percent, with slightly less than five million square feet available at that time.

Absorption of office space in the region has been very weak in the past three years, as the cumulative net change in occupied square feet from January 1999 to June 2001 was just 365,000 square feet, or an annual average of 146,000 square feet. Considering that the annual average absorption from 1994 through 1998 was over one million square feet per year, the regional office market has certainly taken a downturn. A major reason for this downturn was the construction of the Sprint corporate campus, which moved much of the company's space from multi-tenant buildings into its own space, thus freeing hundreds of thousands of square feet of space. The effects of the Sprint move are finally beginning to let up.

Office inventory is generally classified by type or quality:

- Class A: Most prestigious buildings competing for premier office users with rents above average for the area. Buildings have high quality standard finishes, state of the art systems, exceptional accessibility and a definite market presence.
- Class B: Buildings competing for a wide range of users with rents in the average range for the area. Building finishes are fair to good for the area and systems are adequate, but the building does not compete with Class A at the same price.
- Class C: Buildings competing for tenants requiring functional space at rents below the average for the area.

The Northland submarket contains 2.0 million square feet of office space, with the space split evenly between Class A space (48 percent) and Class B space (50 percent)—the area's 42,750 square feet of Class C space only accounts for two percent of the inventory. Vacancy among Class A space in this submarket is very high, as 17 percent of the inventory was available as of June 2001, up substantially from the December 2000 rate of 8.4 percent. Class B space in the Northland submarket, on the other hand, is performing very strongly, with a vacancy rate of just 3.3 percent. The table below compares the Northland area with the region as a whole.

Table 12. Kansas City Metro Area Office Market Profile, June 2001

	Total SF in Area	Vacancy Rate				
		Jun-01	Dec-00	Dec-99	Dec-98	Dec-97
Northland Area						
Class A	958,659	17.0%	8.4%	6.2%	8.0%	12.9%
Class B	999,676	3.3%	9.0%	4.6%	3.4%	4.1%
Class C	42,750	9.8%	15.9%	9.8%	11.4%	9.4%
Total	2,001,085	10.0%	8.9%	5.4%	5.7%	7.5%
Regional Total	47,887,491	13.0%	13.5%	8.4%	7.4%	8.0%

Source: Cohen-Esrey Real Estate Services, Inc.

The Northland submarket has struggled to fill space for many years. Since 1995, net absorption in this submarket has been virtually zero, with a net gain in occupied space of just 52,000 square feet from January 1995 to June 2001. Accordingly, lease rates in this submarket are among the lowest in the region, with a median Class A asking lease rate of just \$17.04. This rate lags far behind stronger suburban submarkets like South Johnson County (\$23.64), North Johnson County (\$19.72), and South Kansas City (\$19.71). Despite a low median rate, though, the top of the Northland market leases for \$22.00, which compares favorably with all

other suburban areas, except for South Johnson County, the region's strongest area. Class B space in the Northland area is also experiencing low lease rates, with a median asking rate of \$13.80, again among the lowest in the region.

Colliers Turley Martin Tucker reports a total inventory in the Northland submarket of 1.9 million square feet. Construction of multi-tenant office space in this area has been very slow in recent years, with only a handful of small buildings (none larger than 100,000 square feet) added to the inventory in the past two years. Colliers also reports that the construction of the Farmland Industries campus is causing a major shock in this submarket already, and will likely keep vacancy rates high for the next few years.

Industrial Market

The Industrial market in the Kansas City region has been very strong in recent years, with a great deal of construction, and low vacancy rates (between five and seven percent since 1995), according to Colliers Turley Martin Tucker. Industrial development has slowed in 2001, however, as much of the 4.4 million square feet built in 2000 was not absorbed. Development in 2001 is expected to only reach about 2.5 million square feet of space.

Regionally, the industrial market contains approximately 132 million square feet of space—65 million in manufacturing, 55 million in warehouse/distribution, and 12 million in flex space. Manufacturing space, which is largely concentrated in user-owned facilities, has a very low vacancy rate of 4.9 percent, and saw just 240,000 square feet added in 2000. Class A warehouse/distribution space is based much more on speculative development, and absorption has begun to fall short of construction, leading to a huge jump in vacancy from 4.0 percent in 1999 to 6.4 percent in 2000. Class B space has seen little activity, and vacancy remains fairly low at 6.5 percent. The flex market has fallen victim to overly aggressive construction, as construction has far outpaced absorption over the past few years, raising the vacancy rate from 6.8 percent in 1996 to 12.5 percent in 2000.

Industrial development in Kansas City metropolitan area is concentrated primarily in three areas: Johnson County, Executive Park/Northland Park, and the area around Kansas City International Airport. In addition, an older industrial concentration of about two million square feet exists just north of the Missouri River.

Johnson County, as with office and retail, has been the region's strongest market for flex space, and the hottest recent industrial market for new development, generating more than half of metro area development in 2000. For heavier industrial uses like manufacturing and distribution space, however, Executive

Park/Northland Park, and the Airport area are the leaders in the region, due to access to truck, rail, barge, and air freight operations. Aside from the Ford Motor plant in Claycomo and the Hallmark Distribution Center, there are no major industrial facilities in or directly adjacent to Liberty. However, Northland Park is only located three miles down Hughes Road from where it would intersect the South Liberty Roadway, and transportation improvements would make the South Liberty area much more convenient to Northland Park.

Memorandum

Date: July 25, 2003
To: Kevin Wallace, HNTB
From: Patrick Phillips, Economics Research Associates
RE: South Liberty Roadway Study - #14388
Demand Forecasts

INTRODUCTION

Economics Research Associates (ERA) was retained by HNTB and the City of Liberty to assist in planning for new development around the South Liberty Roadway, a four-mile corridor that will connect Interstate Highway 35 with State Highway 291. The study consists of two stages: a situation and market analysis (Stage I) and a financial and economic analysis of future growth scenarios (Stage II).

This memorandum summarizes the second part of Stage 1, presenting the market analysis, which is used to inform projections of future growth by land use type within the South Liberty Roadway corridor.

In stage II, we will use these projections to analyze the implications for value capture strategies and will address development economics and supportable land values; magnitude of future value growth; and supportable bonded debt.

SUMMARY

The proposed roadway will help to spur development in a relatively undeveloped part of the region. It has the potential to fundamentally change the market perception of Liberty and to significantly increase the proportion of metropolitan growth captured in the I-35 corridor and in Clay County. ERA estimated future office and industrial space demand for the South Liberty Roadway corridor using Clay County employment trends and projections. Retail space demand is based on the number of area households and the potential expenditure of each household as a percentage of household income. Space demand for each use through 2020 for the South Liberty Corridor is summarized in Table 1.

Table 1. Summary of Space Demand Forecast Ranges for South Liberty Roadway Corridor

In (000's) SQ FT	2000 - 2020	Annual
Office Space Demand		
Low	236.1	11.8
High	331.6	16.6
Industrial Space Demand		
Low	147.8	7.4
High	384.3	19.2
Retail Space Demand		
Low	822.5	41.1
High	826.1	41.3

Source: Economics Research Associates, January 2002

METHODOLOGY

In order to forecast future office, industrial, and retail space demand, and allocation of this demand to the South Liberty Roadway corridor, ERA utilized a model that calculates the demand based on current and projected employment trends. ERA used current employment trends as documented by the Missouri Department of Economic Development to generate future 2010 and 2020 employment projections. Then using the employment figures, office and industrial space demand was estimated based on the percentage of office and industrial space users for each employment category and the square feet per each user for each employment category.

Table 2 shows the industry trends for the percentage of total office and industrial employees that would create demand for new space, and the average square footage per user.

Table 2. Percentage of Office Users and Square Feet of Office and Industrial Users by Category

Category	% Office Users	Ave. Sq. Ft. Per Office User ⁽¹⁾	% Industrial Users	Ave. Sq. Ft. Per Industrial User ⁽¹⁾
Agricultural & Farm	2%	200	25%	300
Mining/Construction	10%	200	60%	250
Manufacturing	20%	200	80%	400
Transp/Comm/Public Utilities	40%	200	25%	400
Wholesale & Retail Trade	15%	200	30%	400
Finance/Insurance/Real Estate	80%	250	5%	200
Services	20%	200	10%	250
Government	50%	200	10%	250

Source: Economics Research Associates, 2002

The demand analysis also factors in vacancy and cumulative replacement demand. The cumulative replacement demand represents new space required by existing businesses to replace obsolete or otherwise unusable space and therefore in addition to net employment growth.

Since all the above calculations are based on county-level employment data, we applied a fair-share analysis method to first allocate this future demand to the City of Liberty and then to the South Liberty Roadway corridor. The fair-share method is based on ratios of office and industrial space and available developable land in the county, city and the South Liberty Roadway.

Two fair-share estimates are calculated for each land use. The first is conservative, based on current trends. The second is more aggressive, assuming the corridor will be able to attract a greater percentage of office and industrial space to the area due to improved accessibility. Retail space demand was calculated separately, using potential retail expenditures and the supportable space needed based on estimated minimum annual performance (in sales per square foot) required by retailers in each category.

CLAY COUNTY - DEMAND FORECAST

The market review examines both the primary and secondary markets with respect to current and future demand for office, industrial and retail properties. The South Liberty Roadway corridor is approximately 2,652 acres and spans between Interstate Highway 35 and State Highway 291.

Map 1. Proposed South Liberty Roadway Corridor – Liberty, MO



Using County employment trends and projections, office, industrial and retail space demand was analyzed using the ERA methodology described in the previous section. Under this approach, we estimate that approximately 4.0 million square feet of office (200,000 SF annual), 4.8 million square feet of industrial (240,000 SF annual) and about 823,000 square feet of retail (41,000 SF annual) can be supported in Clay County from 2000 to 2020.

LIBERTY AND SOUTH LIBERTY ROADWAY CORRIDOR - DEMAND FORECAST

Applying the fair share analysis method yields 236,000 square feet of office space demand for the South Liberty Roadway over a 20-year period, or 12,000 square feet annually. This calculation assumes that since 14.2 percent of the County's office space is in Liberty, and 41.4 percent of the City's developable land is located in the proposed South Liberty Roadway study area, it will capture that corresponding proportion of the County's total share of office demand.

The same methodology was applied to the industrial demand figures. The 20-year industrial space demand for the South Liberty Roadway is 148,000 square feet, based on the 7.4 percent of the county's industrial land located in Liberty, and 41.1 percent of the developable land being in the proposed site.

ERA based retail space demand on site-specific demographic data for a 5-mile market ring around the South Liberty Roadway corridor. The number of trade area households and median household income from the 5-mile market area and consumer expenditure data for 2000 were applied to estimate the potential expenditure of each household as a percentage of household income. Resident expenditure potentials, area employee expenditure potentials, and expenditures from other market segments to South Liberty Roadway, such as pass-through traffic, hotel guests, and other residents of Clay County were considered in calculating total supportable space for retail uses. Based on this analysis, we estimate that the area can support up to 823,000 square feet of retail space over a 20-year period. Table 3 presents all the space demand estimates for the different market areas.

Table 3. Total Space Demand by Use and Market Area 2000-2020

	Clay County	Clay County	City of Liberty	City of Liberty	South Liberty Roadway	South Liberty Roadway
In (000s Square Feet)	2000- 2020	Annual	2000- 2020	Annual	2000- 2020	Annual
Office Space Demand	4,001.0	200.0				
Low			569.7	28.5	236.1	11.8
High			800.2	40.0	331.6	16.6
Industrial Space Demand	4,803.6	240.2				
Low			356.6	17.8	147.8	7.4
High			480.4	24.0	384.3	19.2
Retail Space Demand						
Low					822.5	41.1
High					826.1	41.3

Source: Economics Research Associates, January 2002

Table 3 shows the total demand for office, industrial and retail space. The "low" estimates are based on the current ratio of City of Liberty office and industrial

space to the County's space, which is 14.2 percent for office and 7.4 percent for industrial. The "high" estimates are based on a more aggressive capture of the county's total supply of each use, about 20 percent for office and 10 percent for industrial. This assumes that the proposed roadway would dramatically increase Liberty's market profile. Additionally, as discussed in the previous section, 41.4 percent of the City's developable land is located in the proposed site, but for the industrial "high" capture, it is assumed that it will capture approximately 80% of the city's share due to improved access and infrastructure.

MARKET CONTEXT

Our earlier market analysis memorandum shows that the northeastern submarkets are still emerging. From 1994 through 1998, the annual average absorption of privately owned multi-tenant office space in the region was over one million square feet per year. Between 1999 and 2001 absorption dropped to only 365,000 square feet over the three-year period, or an annual average of 146,000 square feet over a three-year period. The Northland submarket, which contains 2.0 million square feet of office space, has had virtually no net absorption since 1995, with a net gain of only 52,000 square feet between January 1995 and June 2001. As noted above, employment forecasts suggest that Clay County may generate annual office space demand of 200,000 square feet for the next 20 years.

Regionally, the industrial market contains 132 million square feet of space, has a 4.9 percent vacancy rate and added 240,000 square feet of space in 2000. Clay County has approximately 35.8 million square feet of industrial space and has a vacancy rate close to 8 percent. With the exception of the Ford Motor Plant in Claycomo and the Hallmark Distribution Center, there are no major industrial facilities in or directly adjacent to Liberty. The industrial demand analysis for Clay County, which is based on projected employment, estimates 240,000 square feet of space annually, which again may be higher, since in 2000, that was the amount of space added in the region.

The apparent disconnect between recent market trends and the employment-based demand forecast suggests that achieving the expected level of development will require the new roadway to effectively transform Liberty's competitiveness for commercial development. However, we believe the corridor-level projections outlined above are reasonable. They suggest that over the next 20 years the corridor might expect to see three to five high-quality office buildings, one or two significant industrial developments, and one or two shopping centers. This appears consistent with the kind of development experienced in other regions following construction of key connector roadways.

Appendix

**EMPLOYMENT TRENDS & PROJECTIONS FOR
CLAY COUNTY, 1990-2020 (In 000s)
South Liberty Roadway**

	MO Department of Economic Development				Estimated	
	1990	1995	2000	% Change 1990-2000	2010	2020
Agricultural & Farm	1.4	1.5	1.6	16.9%	1.9	2.2
Mining/Construction	2.2	3.0	4.0	80.1%	7.1	12.8
Manufacturing	16.4	17.3	15.5	-5.3%	14.7	13.9
Trans/Comm/Utilities	2.7	2.7	3.3	21.1%	4.0	4.9
Wholesale/Retail Trade	20.5	23.8	26.5	29.2%	34.2	44.2
Finance/Ins/Real Estate	2.5	2.4	2.7	11.6%	3.0	3.4
Services	12.0	17.4	20.5	70.4%	34.9	59.5
Government ⁽¹⁾	7.6	9.1	11.2	48.4%	16.7	24.7
Subtotal	65.2	77.1	85.3	30.8%	116.6	165.7
Average Annual Change	--	3.6%	1.9%	3.1%		

Total Change (In 000s)						
MO Dept. of Economic Development (90-00, 00-10, 10-20)			20.1		31.2	49.1

⁽¹⁾ Includes local, state and Federal government agencies.

Source: MO Department of Economic Development and Economics Research Associates, January 2002.



**OFFICE SPACE DEMAND ANALYSIS
IN CLAY COUNTY, 2001-2020
South Liberty Roadway**

Category	% of Office Users	Sq. Ft. per Office User ⁽¹⁾	Demand for New Space (In 000s of Sq. Ft.)		
			Actual 1990-2000	Estimates 2001-2010	Estimates 2011-2020
Agricultural & Farm	2%	200	0.9	1.1	1.3
Mining/Construction	10%	200	35.2	63.5	114.3
Manufacturing	20%	200	(34.4)	(32.6)	(30.9)
Transp/Comm/Public Utilities	40%	200	46.4	56.2	68.1
Wholesale & Retail Trade	15%	200	179.4	231.7	299.3
Finance/Insurance/Real Estate	80%	250	56.6	63.1	70.4
Services	20%	200	338.9	577.5	984.0
Government	50%	200	366.4	543.7	806.9
Total Demand	30%	206	989.4	1,504.2	2,313.4
<i>Estimates</i>					
Plus					
Vacancy Adjustment ⁽²⁾			24.7	37.6	57.8
Cumulative Replacement Demand ⁽³⁾			14.8	30.1	57.8
Total Office Space Demand (in Sq. Ft.)			1,029.0	1,571.9	2,429.1
Average Annual			102.9	157.2	242.9

⁽¹⁾ Reflects office-using employees in each employment sector requiring office space.

⁽²⁾ This allows for a 2.5% "frictional" vacancy rate in new space delivered to the market inventory.

⁽³⁾ This represents new space required by existing businesses to replace obsolete or otherwise unusable space. This is assumed to represent 1.5% of the total implied demand, increasing to 2% in 2010 and 2.5% in 2020.

Source: Economics Research Associates, January 2002.



**FAIR SHARE - LOW SCENARIO ANALYSIS & PLANNING TARGETS
FOR OFFICE SPACE, 2000-2020
South Liberty Roadway**

Total Space Demanded: 2000-2020 000s Sq. Ft.		
Total Space Demanded ⁽¹⁾	2000-2010	2011-2020
2000 - 2010	1,571.9	2,429.1
Fair Share Capture		
To Clay County		
Current Fair Share	100.0%	100.0%
Total Demand In 000s Sq. Ft.	1,571.9	2,429.1
Annual Sq. Ft.	78.6	121.5
To City of Liberty		
Induced Capture ⁽²⁾	14.2%	14.2%
Total Demand In 000s Sq. Ft.	223.8	345.9
To South Liberty Roadway		
Induced Capture ⁽³⁾	41.4%	41.4%
Total Demand In 000s Sq. Ft.	92.7	143.3
Planning Target (000s)	92.7	143.3

⁽¹⁾ Total space demanded for these uses may be a combination of both rehabilitation and new construction.

⁽²⁾ This represents City of Liberty's current fair share of the Clay County office market. This analysis assumes that City of Liberty's fair share is held constant over the next 20 years (i.e., it is no more or less competitive than it is today as compared to other submarkets and current development patterns remain the same over the next 20 years).

⁽³⁾ Under an induced capture scenario, the South Liberty Roadway is able to capture a greater share of regional office demand as a result of competitive positioning and locational characteristics such as infrastructure improvements, lower land costs, etc.

Source: Economics Research Associates, January 2002.



**FAIR SHARE - HIGH SCENARIO ANALYSIS & PLANNING TARGETS
FOR OFFICE SPACE, 2000-2020
South Liberty Roadway**

Total Space Demanded: 2000-2020		
	000s Sq. Ft.	% Dist.
Total Space Demanded (1)	2000-2010	2011-2020
2000 - 2010	1,571.9	2,429.1
Fair Share Capture		
To Clay County		
Current Fair Share	100.0%	100.0%
Total Demand In 000s Sq. Ft.	1,571.9	2,429.1
Annual Sq. Ft.	78.6	121.5
To City of Liberty		
Induced Capture (2)	20.0%	20.0%
Total Demand In 000s Sq. Ft.	314.4	485.8
To South Liberty Roadway		
Induced Capture (3)	41.4%	41.4%
Total Demand In 000s Sq. Ft.	130.3	201.3
Planning Target (000s)	130.3	201.3

⁽¹⁾ Total space demanded for these uses may be a combination of both rehabilitation and new construction.

⁽²⁾ This represents City of Liberty's current fair share of the Clay County office market. This analysis assumes that City of Liberty's fair share is held constant over the next 20 years (i.e., it is no more or less competitive than it is today as compared to other submarkets and current development patterns remain the same over the next 20 years).

⁽³⁾ Under an induced capture scenario, the South Liberty Roadway is able to capture a greater share of regional office demand as a result of competitive positioning and locational characteristics such as infrastructure improvements, lower land costs, etc.

Source: Economics Research Associates, January 2002.



**GENERAL INDUSTRIAL DEMAND ANALYSIS
IN CLAY COUNTY, 2000-2020
South Liberty Roadway**

Category	% of Industrial Users	Sq. Ft. per Industrial User ⁽¹⁾	Demand for New Space (In 000s of Sq. Ft.)		
			Actual 1990-2000	Estimates 2000-2010	Estimates 2011-2020
Agricultural & Farm	25%	300	17.3	20.2	23.6
Mining/Construction	60%	250	264.3	476.0	857.2
Manufacturing	80%	400	(275.5)	(261.0)	(247.3)
Trans/Comm/Public Utilities	25%	400	58.0	70.3	85.1
Wholesale/Retail Trade	30%	400	717.5	926.9	1,197.4
Finance/Insurance/Real Estate	5%	200	2.8	3.2	3.5
Services	10%	250	211.8	360.9	615.0
Government	10%	250	91.6	135.9	201.7
Total Demand	31%	306	1,087.8	1,732.3	2,736.2
Plus					
Vacancy Adjustment ⁽²⁾	2.5%		27.2	43.3	68.4
Cumulative Replacement Demand ⁽³⁾	5%		54.4	86.6	136.8
Total Industrial Space Demanded (in Sq. Ft.) ⁽⁴⁾			1,169.3	1,862.2	2,941.4
Average Annual			116.9	186.2	294.1

⁽¹⁾ Reflects employees in each employment sector requiring general industrial space. This space is designed to accommodate office/showroom, warehousing and distribution, light assembly or general manufacturing uses, or similar activities requiring flexibility in tenant fitout.

⁽²⁾ The vacancy adjustment allows for a 2.5% "frictional" vacancy rate for new space delivered to the market.

⁽³⁾ This represents new space required by existing businesses to replace obsolete or otherwise unusable space. This is assumed to represent 5% of the total implied demand in Liberty.

⁽⁴⁾ Total space demanded for these uses may be a combination of both rehabilitation and new construction

Source: Economics Research Associates, January 2002.



**FAIR SHARE - LOW SCENARIO ANALYSIS & PLANNING TARGETS
FOR GENERAL INDUSTRIAL SPACE, 2000-2020**

Total Space Demanded: 2000-2020		
	000s Sq. Ft.	% Dist.
Total Space Demanded ⁽¹⁾		
General Industrial	1,862.2	2,941.4
Fair Share Capture		
To Clay County		
Current Fair Share	100.0%	100.0%
Total Demand In 000s Sq. Ft.	1,862.2	2,941.4
Annual Sq. Ft.	93.1	147.1
To City of Liberty		
Induced Capture ⁽²⁾	7.4%	7.4%
Total Demand In 000s Sq. Ft.	138.2	218.4
To South Liberty Roadway		
Induced Capture ⁽³⁾	41.4%	41.4%
Total Demand In 000s Sq. Ft.	57.3	90.5
20-YR. PLANNING TARGET (000s):	57.3	90.5

- (1) Total space demanded for these uses may be a combination of both rehabilitation and new construction.
- (2) This represents City of Liberty's current fair share of the the region's industrial market. This analysis assumes that the submarket's fair share is held constant over the next 20 years (I.e., it is no more or less competitive than it is today as compared to other submarkets, and current development patterns remain the same over the next 20 years).
- (3) Under an induced capture scenario, South Liberty Roadway is able to capture a greater share of regional industrial demand as a result of competitive positioning and locational characteristics such as immediate highway access, visibility, lower land costs, etc.

Source: Economics Research Associates, January 2002.



**FAIR SHARE - HIGH SCENARIO ANALYSIS & PLANNING TARGETS
FOR GENERAL INDUSTRIAL SPACE, 2000-2020**

Total Space Demanded: 2000-2020		
	000s Sq. Ft.	% Dist.
Total Space Demanded ⁽¹⁾	2000-2010	2011-2020
General Industrial	1,862.2	2,941.4
Fair Share Capture		
To Clay County		
Current Fair Share	100.0%	100.0%
Total Demand In 000s Sq. Ft.	1,862.2	2,941.4
Annual Sq. Ft.	93.1	147.1
To City of Liberty		
Induced Capture (2)	10.0%	10.0%
Total Demand In 000s Sq. Ft.	186.2	294.1
To South Liberty Roadway		
Induced Capture (3)	80.0%	80.0%
Total Demand In 000s Sq. Ft.	149.0	235.3
20-YR. PLANNING TARGET (000s):	149.0	235.3

- (1) Total space demanded for these uses may be a combination of both rehabilitation and new construction.
- (2) This represents City of Liberty's current fair share of the the region's industrial market. This analysis assumes that the submarket's fair share is held constant over the next 20 years (i.e., it is no more or less competitive than it is today as compared to other submarkets, and current development patterns remain the same over the next 20 years).
- (3) Under an induced capture scenario, South Liberty Roadway is able to capture a greater share of regional industrial demand as a result of competitive positioning and locational characteristics such as immediate highway access, visibility, lower land costs, etc.

Source: Economics Research Associates, January 2002.



POTENTIAL RETAIL EXPENDITURES & SUPPORTABLE SPACE - LOW SHARE SCENARIO
South Liberty Roadway

	2010	2020	TOTAL
Potential Retail Expenditures			
On-site Households			
Households	13,247	15,380	28,627
Median Household Income (In Current \$)	\$ 60,854	\$ 77,925	
Household Expenditure Potentials (As % of Household Income)			
General Retail	14.5% \$ 116,635,607	\$ 173,390,881	
Food & Beverage	7.2% 57,719,470	85,805,956	
Food at Home (Groceries)	7.0% 56,060,548	83,339,797	
Resident Expenditure Potentials	\$ 230,415,625	\$ 342,536,634	
Office Employees			
Sq. Ft. (Rounded)	92,747	143,324	236,071
Employees	559	853	1,412
Industrial Employees			
Sq. Ft. (Rounded)	57,286	90,485	147,771
Employees	187	285	473
Average Annual Spending (In Current \$)			
General Retail	\$ 500 \$ 372,962	\$ 569,280	
Food & Beverage	1,500 1,118,886	1,707,841	
Employee Expenditure Potentials	\$ 1,491,848	\$ 2,277,122	



POTENTIAL RETAIL EXPENDITURES & SUPPORTABLE SPACE - LOW SHARE SCENARIO
South Liberty Roadway

	2010	2020	TOTAL
SUPPORTABLE SPACE			
General Retail			
On-site Households	\$ 116,635,607	\$ 173,390,881	
On-site Employees	372,962	569,280	
Subtotal:	\$ 117,008,569	\$ 173,960,162	
Plus Inflow Factor ⁽¹⁾ @ 15.0%	17,551,285	26,094,024	
TOTAL - GENERAL RETAIL	\$ 134,559,855	\$ 200,054,186	
 CAPTURED EXPENDITURES @ 40.0%	 \$ 53,823,942	 \$ 80,021,674	
Required Productivity ⁽²⁾	\$ 250	\$ 250	

POTENTIAL RETAIL EXPENDITURES & SUPPORTABLE SPACE
South Liberty Roadway

Supportable Space - General Retail	215,296	320,087	535,382
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Food & Beverage			
On-site Households	\$ 57,719,470	\$ 85,805,956	
On-site Employees	1,118,886	1,707,841	
Subtotal:	\$ 58,838,356	\$ 87,513,797	
Plus Inflow Factor ⁽¹⁾ @ 20.0%	11,767,671	17,502,759	
TOTAL - FOOD & BEVERAGE:	\$ 70,606,027	\$ 105,016,556	
 CAPTURED EXPENDITURES @ 35.0%	 \$ 24,712,110	 \$ 36,755,795	
Required Productivity ⁽²⁾	\$ 350	\$ 350	

Supportable Space - Food & Beverage	70,606	105,017	175,623
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Food At Home (Groceries)			
On-site Households	\$ 56,060,548	\$ 83,339,797	
Plus Inflow Factor ⁽¹⁾ @ 10.0%	5,606,055	8,333,980	
TOTAL - GROCERIES:	\$ 61,666,603	\$ 91,673,777	
 CAPTURED EXPENDITURES @ 40.0%	 \$ 24,666,641	 \$ 36,669,511	
Required Productivity ⁽²⁾	\$ 550	\$ 550	

Supportable Space - Groceries	44,848	66,672	111,520
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Total Supportable Space (in Sq. Ft.)	330,750	491,775	822,525
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⁽¹⁾ Represents potential expenditures from other market segments to South Liberty Roadway, such as pass-through traffic, hotel guests, other residents of Clay County, etc.

⁽²⁾ Required productivity is the estimated minimum annual performance (in sales per sq. ft.) levels required by retailers in each category.



POTENTIAL RETAIL EXPENDITURES & SUPPORTABLE SPACE - HIGH SHARE SCENARIO

South Liberty Roadway

		2010	2020	TOTAL
Potential Retail Expenditures				
On-site Households				
Households		13,247	15,380	28,627
Median Household Income (In Current \$)	\$	60,854	\$ 77,925	
Household Expenditure Potentials (As % of Household Income)				
General Retail	14.5%	\$ 116,635,607	\$ 173,390,881	
Food & Beverage	7.2%	57,719,470	85,805,956	
Food at Home (Groceries)	7.0%	56,060,548	83,339,797	
Resident Expenditure Potentials				
	\$	230,415,625	\$ 342,536,634	
Office Employees				
Sq. Ft. (Rounded)		130,271	201,311	331,582
Employees		785	1,198	1,983
Industrial Employees				
Sq. Ft. (Rounded)		148,976	235,315	384,291
Employees		487	742	1,229
Average Annual Spending (In Current \$)				
General Retail	\$ 500	\$ 635,807	\$ 970,298	
Food & Beverage	1,500	1,907,422	2,910,894	
Employee Expenditure Potentials				
	\$	2,543,230	\$ 3,881,191	



POTENTIAL RETAIL EXPENDITURES & SUPPORTABLE SPACE - HIGH SHARE SCENARIO
South Liberty Roadway

	2010	2020	TOTAL
SUPPORTABLE SPACE			
General Retail			
On-site Households	\$ 116,635,607	\$ 173,390,881	
On-site Employees	635,807	970,298	
Subtotal:	\$ 117,271,415	\$ 174,361,179	
Plus Inflow Factor ⁽¹⁾ @ 15.0%	17,590,712	26,154,177	
TOTAL - GENERAL RETAIL	\$ 134,862,127	\$ 200,515,356	
CAPTURED EXPENDITURES @ 40.0%	\$ 53,944,851	\$ 80,206,142	
Required Productivity ⁽²⁾	\$ 250	\$ 250	

POTENTIAL RETAIL EXPENDITURES & SUPPORTABLE SPACE
South Liberty Roadway

Supportable Space - General Retail	215,779	320,825	536,604
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Food & Beverage			
On-site Households	\$ 57,719,470	\$ 85,805,956	
On-site Employees	1,907,422	2,910,894	
Subtotal:	\$ 59,626,892	\$ 88,716,849	
Plus Inflow Factor ⁽¹⁾ @ 20.0%	11,925,378	17,743,370	
TOTAL - FOOD & BEVERAGE:	\$ 71,552,270	\$ 106,460,219	
CAPTURED EXPENDITURES @ 35.0%	\$ 25,043,295	\$ 37,261,077	
Required Productivity ⁽²⁾	\$ 350	\$ 350	

Supportable Space - Food & Beverage	71,552	106,460	178,012
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Food At Home (Groceries)			
On-site Households	\$ 56,060,548	\$ 83,339,797	
Plus Inflow Factor ⁽¹⁾ @ 10.0%	5,606,055	8,333,980	
TOTAL - GROCERIES:	\$ 61,666,603	\$ 91,673,777	
CAPTURED EXPENDITURES @ 40.0%	\$ 24,666,641	\$ 36,669,511	
Required Productivity ⁽²⁾	\$ 550	\$ 550	

Supportable Space - Groceries	44,848	66,672	111,520
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Total Supportable Space (in Sq. Ft.)	332,180	493,957	826,137
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⁽¹⁾ Represents potential expenditures from other market segments to South Liberty Roadway, such as pass-through traffic, hotel guests, other residents of Clay County, etc.

⁽²⁾ Required productivity is the estimated minimum annual performance (in sales per sq. ft.) levels required by retailers in each category.

Memorandum

Date: August 6, 2003
To: Kevin Wallace, HNTB
From: Economics Research Associates
RE: South Liberty Roadway Study - #14388
Value Capture Analysis

INTRODUCTION

Economics Research Associates (ERA) was retained by HNTB and the City of Liberty to assist in planning for new development around the South Liberty Roadway, a four-mile corridor that will connect Interstate Highway 35 with State Highway 291. The study consists of two stages: a situation and market analysis (Stage I) and a financial and economic analysis of future growth scenarios (Stage II).

This memorandum summarizes Stage II, presenting the findings of an analysis of development economics and supportable land values; magnitude of future value growth; and supportable bonded debt. We have utilized the findings of the market analysis conducted in Stage I and our previous estimates for supportable development in the corridor to the year-20 forecast horizon. The retail space component of the program was capped at approximately 710,000 square feet to reflect the total retail land requirement of the City of Liberty's preferred land use scenario for the corridor.

SUMMARY

We have previously presented the findings of a market analysis and believe that the proposed roadway will help to spur development in a relatively undeveloped part of the region. It has the potential to fundamentally change the market perception of Liberty and to significantly increase the proportion of metropolitan growth captured in the I-35 corridor and in Clay County.

Based on the results of the market analysis and a pro forma residual land value analysis, we have modeled the potential net new fiscal revenues and supportable public investment directly attributable to forecast land use change as a result of the highway improvements in the corridor. Based on existing tax rates the land use change and associated development in the corridor at the rate of absorption that we

have forecast will result in total 30-year fiscal revenues to the City of Liberty of approximately \$27 - \$28 million.

City of Liberty, MO		
South Liberty Roadway Study		
Supportable Public Investment Analysis		
Summary of Tax Revenues and Supportable Public Investment		
Source/Use	20-Year Tax Revenues	
Property Tax		
Retail	\$2,890,000	
Office	\$990,000	
Industrial	\$500,000	
Sales Tax	\$23,150,000	
Total	\$27,530,000	
Supportable Public Investment @ 5% \$14,400,000		
<i>Source: Economics Research Associates</i>		

Utilizing a discount rate of five percent, we estimate the net present value or, the supportable public investment in the corridor at approximately \$14 - \$15 million.

METHODOLOGY

In order to estimate the supportable public investment in the South Liberty Roadway corridor, ERA conducted a discounted 20-year fiscal revenue analysis. The analysis was comprised of the following components:

- The development of model assumptions and inputs including: the development program, existing land values, development costs and future market values, floor area ratios and land requirements and, City of Liberty assessment and tax rates;
- A stabilized year pro forma financial analysis to determine supportable land values for retail, office and industrial uses;

- Determination of net cumulative change in real estate market value and assessed taxable value;
- Quantification of net change in real estate tax revenues to the City of Liberty;
- Estimates of retail sales and retail sales tax revenues to the City of Liberty;
- Determination of supportable public investment attributable to land use change in the corridor.

This type of analysis quantifies the net new fiscal revenues attributable to forecast land use change in the corridor and discounts the revenue stream back to arrive at a net present value. The net present value represents the supportable public investment directly attributable to land use change. The discount rate represents the costs associated with issuing and retiring publicly bonded debt.

We would stress that the analysis is limited to quantifying the direct impacts associated with the land use change in the corridor that passes the “but for” test: but for the transportation improvements associated with South Liberty Roadway the land use change would not otherwise have occurred. Excluded from the analysis is a quantification of other potential economic and fiscal benefits that might occur on a regional level such as: travel time and associated cost savings; the potential impact of land use change in the corridor on the market perception and regional competitiveness of the City in general; and, direct and indirect economic impacts associated with new workers in the corridor and region. Such an analysis could form part of a comprehensive analysis of the economic and environmental impacts when plans for the Roadway are further advanced.

The Appendix contains the model tables and the following summarizes the results of the analysis.

MODEL ASSUMPTIONS/INPUTS

We have developed a set of assumptions and model inputs that are presented in Appendix Tables 1 and 2. These assumptions are based primarily on the findings of the market analysis conducted in Stage I of the assignment and also on other intelligence acquired throughout the course of the assignment. The development costs have been estimated utilizing typical industry standards for the Kansas City region and for the highway-oriented nature of the development envisioned in the corridor. Based on our previous estimates for market supportable development in the corridor over the next twenty years, we believe approximately 120 acres of land will be required to accommodate the land uses in the program. We have netted-out the displaced land and associated taxable value from the results of analysis to arrive at incremental net new fiscal revenues to the City of Liberty.

RESIDUAL VALUE FINANCIAL ANALYSIS

Appendix Table 3 presents the results of a stabilized year pro forma financial analysis conducted to determine the supportable land values as an input to the fiscal impact analysis that follows. We believe that retail land prices in the corridor fall in the \$6.00- \$7.00 range per square foot, office prices at approximately \$3.00 - \$3.50 and industrial land values at around \$2.00.

LAND AND BUILDING ABSORPTION

The 20-year supportable development program will be absorbed by the market throughout the forecast period. We have developed what we believe to be a reasonable absorption schedule for development and land which reflects both recent and existing market conditions and trends and project completion in year 1 of the analysis. Appendix Table 4 reveals that we have ramped up absorption for office and industrial uses following construction of the highway improvements as the market recovers from the current recession and responds to a demand for space at this location generated by the roadway. The retail absorption schedule is more globular and is based on the assumption that a community sized shopping center of between 60,000 – 80,000 square feet could be absorbed by the market every two years or so.

CUMULATIVE CHANGE IN MARKET AND ASSESSED VALUE

Appendix Tables 5 and 6 summarize the results of the analysis to determine the net change in market and assessed or, taxable value. Existing market values refer to the displaced agricultural and residentially zoned land as it is absorbed for commercial development. We estimate that this land has a total market value in current dollars of approximately \$1.6 million and is netted out of the results of the analysis as indicated by the negative values. We estimate the future market value of the improvements and land at approximately \$139.7 million by year 20.

Market value translates to assessed value by applying the assessment ratios applicable to the City of liberty. It is the assessed value of the buildings and improvements to which the property tax rate is applied. The assessed value is significantly lower than the market value because an assessment ratio of 32 percent is applied for the purpose of taxing commercial real estate. This, coupled with the tax rate itself, has important implications for the ultimate magnitude of the potential tax revenues attributable to the land use change and hence supportable public investment in the corridor. We estimate the cumulative net change in assessed value in the corridor at approximately \$44.9 million by year 20.

NET NEW REAL ESTATE PROPERTY AND RETAIL SALES TAXES AND SUPPORTABLE PUBLIC INVESTMENT

As Appendix Tables 7 and 8 reveal, we estimate that the land use change in the corridor will generate approximately \$4.4 million in property tax revenues and \$23.2 million in retail sales taxes to the City of Liberty over the 20-year period of the analysis. As noted above, however, this total fiscal benefit of approximately \$27.6 million does not represent the supportable public investment in the corridor since the fiscal revenue streams must be discounted back to arrive at net present values. We have utilized a discount rate of five percent for the purposes of this analysis. This resultant total value of approximately \$14 - \$15 million is essentially equal to the supportable publicly bonded debt in the corridor over the next 20 years.

Appendix



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Supportable Public Investment Analysis

Appendix Table 1:
Assumptions/Inputs

Program

Use	Gross SF	Net/Gross Ratio	Net Units/SF
Retail	707,850	0.85	601,673
Office	285,000	0.90	256,500
Industrial	265,000	1.00	265,000

Land Requirement

Use	Floor Area Ratio	Land Required	
		Square Feet	Acres
Retail	0.25	2,831,400	65.0
Office	0.25	1,140,000	26.2
Industrial	0.20	1,325,000	30.4

Market Values

Improvements (@ 80% Development Costs)

Use	Hard and Soft Costs Per Square Foot	Market Value	Market Value Per Square Foot
Retail	\$120	\$67,953,600	\$96
Office	\$125	\$28,500,000	\$100
Industrial	\$65	\$13,780,000	\$52
Total	-	\$110,233,600	-

Land

Use	Market Value Per Square Foot
Agricultural	\$0.20
Residential (Low Density)	\$0.40
Retail	\$6.50
Office	\$3.25
Industrial	\$2.00

Existing Zoning Mix

Agricultural	50%
Residential (Low Density)	50%

Productivity

Annual Retail Sales Per Sq.Ft.	\$300
Retail Occupancy Rate	95%

City Tax Rates

Real Property Assessment Rates:

Agricultural	12%
Residential	19%
Commercial	32%

Tax Rate Per \$100 Assessed Value	\$ 0.9952
State Multiplier	1.00
City Sales Tax Rate	2.25%
Proportion Retail Sales Taxes Net New	60.0%

Source: City of Liberty; Economics Research Associates



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Appendix Table 2:
Operating Assumptions

Retail

Average Tripple Net Rent Per Sq. Ft.	\$20.00
Unrecoverable Expenses @	15.0%
Net Income	\$17.00
Average Occupancy	95%

Office

Average Gross Rent Per Sq. Ft.	\$19.00
Expenses @	20%
Net Income	\$15.20
Average Occupancy	95%

Industrial/Flex

Average Gross Rent Per Sq. Ft.	\$7.50
Expenses @	6%
Net Rents	\$7.05
Average Occupancy	100%

Source: Economics Research Associates



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Appendix Table 3:
Consolidated Stabilized Year Pro Forma and Residual Land Value

Project Description	Retail	Office	Industrial	Total
Total Hard and Soft Costs	\$84,942,000	\$35,625,000	\$17,225,000	\$137,792,000
Misc. Interest and Fees @ 5%	\$4,247,100	\$1,781,250	\$861,250	\$6,889,600
Total Development Costs	\$89,189,100	\$37,406,250	\$18,086,250	\$144,681,600
Land Acquisition Costs (2)				
Per Sq. Ft. - Land	-	-	-	
Per Sq. Ft. - FAR	-	-	-	
Total Land Costs :	-	-	-	
TOTAL DEVELOPMENT COSTS	\$89,189,100	\$37,406,250	\$18,086,250	\$144,681,600
Revenues and Expenses				
Total Net Income:	\$9,717,011	\$3,703,860	\$1,868,250	\$15,289,121
Residual Land Value				
Capitalization Rate	9%	9%	9%	
Indicated Value:	\$107,966,788	\$41,154,000	\$20,758,333	\$169,879,121
Less Development Costs:	\$89,189,100	\$37,406,250	\$18,086,250	\$144,681,600
Total Residual Value:	\$18,777,688	\$3,747,750	\$2,672,083	\$25,197,521
Per Square Foot Land	\$6.63	\$3.29	\$2.02	
Per Acre	\$288,888	\$143,204	\$87,846	

Source: Economics Research Associates

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Supportable Public Investment Analysis

Appendix Table 4: Land and Building Absorption

Absorption Schedule

Use	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Retail	0%	10%	0%	10%	0%	10%	0%	10%	0%	10%
Office	3%	3%	3%	5%	6%	6%	6%	6%	6%	6%
Industrial	3%	3%	3%	5%	6%	6%	6%	6%	6%	6%

Use	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Retail	0%	10%	0%	10%	0%	10%	0%	10%	0%	10%
Office	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Industrial	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%

Square Feet Absorbed

Use	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Retail	0	70,785	0	70,785	0	70,785	0	70,785	0	70,785
Office	8,550	8,550		14,250	17,100	17,100	17,100	17,100	17,100	17,100
Industrial	7,950	7,950	7,950	13,250	15,900	15,900	15,900	15,900	15,900	15,900

Use	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Retail	0	70,785	0	70,785	0	70,785	0	70,785	0	70,785
Office	14,250	14,250	14,250	14,250	14,250	14,250	14,250	14,250	14,250	14,250
Industrial	13,250	13,250	13,250	13,250	13,250	13,250	13,250	13,250	13,250	13,250

Land Absorbed

Use	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Retail	0	283,140	0	283,140	0	283,140	0	283,140	0	283,140
Office	34,200	34,200	34,200	57,000	68,400	68,400	68,400	68,400	68,400	68,400
Industrial	39,750	39,750	39,750	66,250	79,500	79,500	79,500	79,500	79,500	79,500
Total	73,950	357,090	73,950	406,390	147,900	431,040	147,900	431,040	147,900	431,040

Use	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Retail	0	283,140	0	283,140	0	283,140	0	283,140	0	283,140
Office	57,000	57,000	57,000	57,000	57,000	57,000	57,000	57,000	57,000	57,000
Industrial	66,250	66,250	66,250	66,250	66,250	66,250	66,250	66,250	66,250	66,250
Total	123,250	406,390	123,250	406,390	123,250	406,390	123,250	406,390	123,250	406,390

Source: Economics Research Associates

City of Liberty, MO South Liberty Roadway Study

Supportable Public Investment Analysis

**Appendix Table 5:
Cumulative Change in Market Value**

Variable	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Existing Market Value										
Agricultural Zoned	(\$7,395)	(\$43,104)	(\$50,499)	(\$91,138)	(\$105,928)	(\$149,032)	(\$163,822)	(\$206,926)	(\$221,716)	(\$264,820)
Residential Zoned	(\$14,790)	(\$86,208)	(\$100,998)	(\$182,276)	(\$211,856)	(\$298,064)	(\$327,644)	(\$413,852)	(\$443,432)	(\$529,640)
Sub-Total	(\$22,185)	(\$129,312)	(\$151,497)	(\$273,414)	(\$317,784)	(\$447,096)	(\$491,466)	(\$620,778)	(\$665,148)	(\$794,460)
Improved Market Value										
Retail										
Land	\$0	\$1,840,410	\$1,840,410	\$3,680,820	\$3,680,820	\$5,521,230	\$5,521,230	\$7,361,640	\$7,361,640	\$9,202,050
Buildings	\$0	\$6,795,360	\$6,795,360	\$13,590,720	\$13,590,720	\$20,386,080	\$20,386,080	\$27,181,440	\$27,181,440	\$33,976,800
Sub-Total	\$0	\$8,635,770	\$8,635,770	\$17,271,540	\$17,271,540	\$25,907,310	\$25,907,310	\$34,543,080	\$34,543,080	\$43,178,850
Office										
Land	\$111,150	\$222,300	\$333,450	\$518,700	\$741,000	\$963,300	\$1,185,600	\$1,407,900	\$1,630,200	\$1,852,500
Buildings	\$855,000	\$1,710,000	\$1,710,000	\$3,135,000	\$4,845,000	\$6,555,000	\$8,265,000	\$9,975,000	\$11,685,000	\$13,395,000
Sub-Total	\$966,150	\$1,932,300	\$2,043,450	\$3,653,700	\$5,586,000	\$7,518,300	\$9,450,600	\$11,382,900	\$13,315,200	\$15,247,500
Industrial										
Land	\$79,500	\$159,000	\$238,500	\$371,000	\$530,000	\$689,000	\$848,000	\$159,000	\$318,000	\$477,000
Buildings	\$413,400	\$826,800	\$1,240,200	\$1,929,200	\$2,756,000	\$3,582,800	\$4,409,600	\$5,236,400	\$6,063,200	\$6,890,000
Sub-Total	\$492,900	\$985,800	\$1,478,700	\$2,300,200	\$3,286,000	\$4,271,800	\$5,257,600	\$5,395,400	\$6,381,200	\$7,367,000
Net Change	\$1,436,865	\$11,424,558	\$12,006,423	\$22,952,026	\$25,825,756	\$37,250,314	\$40,124,044	\$50,700,602	\$53,574,332	\$64,998,890

Variable	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Agricultural Zoned	(\$277,145)	(\$317,784)	(\$330,109)	(\$370,748)	(\$383,073)	(\$423,712)	(\$436,037)	(\$476,676)	(\$489,001)	(\$529,640)
Residential Zoned	(\$554,290)	(\$635,568)	(\$660,218)	(\$741,496)	(\$766,146)	(\$847,424)	(\$872,074)	(\$953,352)	(\$978,002)	(\$1,059,280)
Sub-Total	(\$831,435)	(\$953,352)	(\$990,327)	(\$1,112,244)	(\$1,149,219)	(\$1,271,136)	(\$1,308,111)	(\$1,430,028)	(\$1,467,003)	(\$1,588,920)
Improved Market Value										
Retail										
Land	\$10,003,175	\$12,644,710	\$13,445,835	\$16,087,370	\$16,888,495	\$19,530,030	\$20,331,155	\$22,972,690	\$23,773,815	\$26,415,350
Buildings	\$33,976,800	\$40,772,160	\$40,772,160	\$47,567,520	\$47,567,520	\$54,362,880	\$54,362,880	\$61,158,240	\$61,158,240	\$67,953,600
Sub-Total	\$43,979,975	\$53,416,870	\$54,217,995	\$63,654,890	\$64,456,015	\$73,892,910	\$74,694,035	\$84,130,930	\$84,932,055	\$94,368,950
Office										
Land	\$2,037,750	\$2,223,000	\$2,408,250	\$2,593,500	\$2,778,750	\$2,964,000	\$3,149,250	\$3,334,500	\$3,519,750	\$3,705,000
Buildings	\$14,820,000	\$16,245,000	\$17,670,000	\$19,095,000	\$20,520,000	\$21,945,000	\$23,370,000	\$24,795,000	\$26,220,000	\$27,645,000
Sub-Total	\$16,857,750	\$18,468,000	\$20,078,250	\$21,688,500	\$23,298,750	\$24,909,000	\$26,519,250	\$28,129,500	\$29,739,750	\$31,350,000
Industrial										
Land	\$609,500	\$742,000	\$874,500	\$1,007,000	\$1,139,500	\$1,272,000	\$1,404,500	\$1,537,000	\$1,669,500	\$1,802,000
Buildings	\$7,579,000	\$8,268,000	\$8,957,000	\$9,646,000	\$10,335,000	\$11,024,000	\$11,713,000	\$12,402,000	\$13,091,000	\$13,780,000
Sub-Total	\$8,188,500	\$9,010,000	\$9,831,500	\$10,653,000	\$11,474,500	\$12,296,000	\$13,117,500	\$13,939,000	\$14,760,500	\$15,582,000
Net Change	\$68,194,790	\$79,941,518	\$83,137,418	\$94,884,146	\$98,080,046	\$109,826,774	\$113,022,674	\$124,769,402	\$127,965,302	\$139,712,030

Source: Economics Research Associates

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**Appendix Table 6:
Cumulative Change in Assessed Value**

Variable	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Existing Assessed Value										
Agricultural Zoned	(\$887)	(\$5,172)	(\$6,060)	(\$10,937)	(\$12,711)	(\$17,884)	(\$19,659)	(\$24,831)	(\$26,606)	(\$31,778)
Residential Zoned	(\$2,810)	(\$16,380)	(\$19,190)	(\$34,632)	(\$40,253)	(\$56,632)	(\$62,252)	(\$78,632)	(\$84,252)	(\$100,632)
Sub-Total	(\$3,698)	(\$21,552)	(\$25,250)	(\$45,569)	(\$52,964)	(\$74,516)	(\$81,911)	(\$103,463)	(\$110,858)	(\$132,410)
Improved Assessed Value										
Retail										
Land	\$0	\$588,931	\$588,931	\$1,177,862	\$1,177,862	\$1,766,794	\$1,766,794	\$2,355,725	\$2,355,725	\$2,944,656
Buildings	\$0	\$2,174,515	\$2,174,515	\$4,349,030	\$4,349,030	\$6,523,546	\$6,523,546	\$8,698,061	\$8,698,061	\$10,872,576
Sub-Total	\$0	\$2,763,446	\$2,763,446	\$5,526,893	\$5,526,893	\$8,290,339	\$8,290,339	\$11,053,786	\$11,053,786	\$13,817,232
Office										
Land	\$35,568	\$71,136	\$106,704	\$165,984	\$237,120	\$308,256	\$379,392	\$450,528	\$521,664	\$592,800
Buildings	\$273,600	\$547,200	\$547,200	\$1,003,200	\$1,550,400	\$2,097,600	\$2,644,800	\$3,192,000	\$3,739,200	\$4,286,400
Sub-Total	\$309,168	\$618,336	\$653,904	\$1,169,184	\$1,787,520	\$2,405,856	\$3,024,192	\$3,642,528	\$4,260,864	\$4,879,200
Industrial										
Land	\$25,440	\$50,880	\$76,320	\$118,720	\$169,600	\$220,480	\$271,360	\$50,880	\$101,760	\$152,640
Buildings	\$132,288	\$264,576	\$396,864	\$617,344	\$881,920	\$1,146,496	\$1,411,072	\$1,675,648	\$1,940,224	\$2,204,800
Sub-Total	\$157,728	\$315,456	\$473,184	\$736,064	\$1,051,520	\$1,366,976	\$1,682,432	\$1,726,528	\$2,041,984	\$2,357,440
Net Change	\$463,199	\$3,675,686	\$3,865,285	\$7,386,572	\$8,312,969	\$11,988,655	\$12,915,052	\$16,319,379	\$17,245,776	\$20,921,462

Variable	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Agricultural Zoned	(\$33,257)	(\$38,134)	(\$39,613)	(\$44,490)	(\$45,969)	(\$50,845)	(\$52,324)	(\$57,201)	(\$58,680)	(\$63,557)
Residential Zoned	(\$105,315)	(\$120,758)	(\$125,441)	(\$140,884)	(\$145,568)	(\$161,011)	(\$165,694)	(\$181,137)	(\$185,820)	(\$201,263)
Sub-Total	(\$138,573)	(\$158,892)	(\$165,055)	(\$185,374)	(\$191,537)	(\$211,856)	(\$218,019)	(\$238,338)	(\$244,501)	(\$264,820)
Improved Market Value										
Retail										
Land	\$3,201,016	\$4,046,307	\$4,302,667	\$5,147,958	\$5,404,318	\$6,249,610	\$6,505,970	\$7,351,261	\$7,607,621	\$8,452,912
Buildings	\$10,872,576	\$13,047,091	\$13,047,091	\$15,221,606	\$15,221,606	\$17,396,122	\$17,396,122	\$19,570,637	\$19,570,637	\$21,745,152
Sub-Total	\$14,073,592	\$17,093,398	\$17,349,758	\$20,369,565	\$20,625,925	\$23,645,731	\$23,902,091	\$26,921,898	\$27,178,258	\$30,198,064
Office										
Land	\$652,080	\$711,360	\$770,640	\$829,920	\$889,200	\$948,480	\$1,007,760	\$1,067,040	\$1,126,320	\$1,185,600
Buildings	\$4,742,400	\$5,198,400	\$5,654,400	\$6,110,400	\$6,566,400	\$7,022,400	\$7,478,400	\$7,934,400	\$8,390,400	\$8,846,400
Sub-Total	\$5,394,480	\$5,909,760	\$6,425,040	\$6,940,320	\$7,455,600	\$7,970,880	\$8,486,160	\$9,001,440	\$9,516,720	\$10,032,000
Industrial										
Land	\$195,040	\$237,440	\$279,840	\$322,240	\$364,640	\$407,040	\$449,440	\$491,840	\$534,240	\$576,640
Buildings	\$2,425,280	\$2,645,760	\$2,866,240	\$3,086,720	\$3,307,200	\$3,527,680	\$3,748,160	\$3,968,640	\$4,189,120	\$4,409,600
Sub-Total	\$2,620,320	\$2,883,200	\$3,146,080	\$3,408,960	\$3,671,840	\$3,934,720	\$4,197,600	\$4,460,480	\$4,723,360	\$4,986,240
Net Change	\$21,949,820	\$25,727,466	\$26,755,824	\$30,533,471	\$31,561,828	\$35,339,475	\$36,367,833	\$40,145,480	\$41,173,837	\$44,951,484

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Appendix Table 7:
Net New Property Taxes and Supportable Public Investment

Variable	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
Existing Property Taxes											
Agricultural Zoned	(\$9)	(\$51)	(\$60)	(\$109)	(\$127)	(\$178)	(\$196)	(\$247)	(\$265)	(\$316)	(\$1,558)
Residential Zoned	(\$28)	(\$163)	(\$191)	(\$345)	(\$401)	(\$564)	(\$620)	(\$783)	(\$838)	(\$1,001)	(\$4,933)
Sub-Total	(\$37)	(\$214)	(\$251)	(\$454)	(\$527)	(\$742)	(\$815)	(\$1,030)	(\$1,103)	(\$1,318)	(\$6,491)
Improved Property Taxes											
Retail											
Land	\$0	\$5,861	\$5,861	\$11,722	\$11,722	\$17,583	\$17,583	\$23,444	\$23,444	\$29,305	\$146,526
Buildings	\$0	\$21,641	\$21,641	\$43,282	\$43,282	\$64,922	\$64,922	\$86,563	\$86,563	\$108,204	\$541,019
Sub-Total	\$0	\$27,502	\$27,502	\$55,004	\$55,004	\$82,505	\$82,505	\$110,007	\$110,007	\$137,509	\$687,545
Office											
Land	\$354	\$708	\$1,062	\$1,652	\$2,360	\$3,068	\$3,776	\$4,484	\$5,192	\$5,900	\$28,554
Buildings	\$2,723	\$5,446	\$5,446	\$9,984	\$15,430	\$20,875	\$26,321	\$31,767	\$37,213	\$42,658	\$197,862
Sub-Total	\$3,077	\$6,154	\$6,508	\$11,636	\$17,789	\$23,943	\$30,097	\$36,250	\$42,404	\$48,558	\$226,415
Industrial											
Land	\$253	\$506	\$760	\$1,182	\$1,688	\$2,194	\$2,701	\$506	\$1,013	\$1,519	\$12,321
Buildings	\$1,317	\$2,633	\$3,950	\$6,144	\$8,777	\$11,410	\$14,043	\$16,676	\$19,309	\$21,942	\$106,200
Sub-Total	\$1,570	\$3,139	\$4,709	\$7,325	\$10,465	\$13,604	\$16,744	\$17,182	\$20,322	\$23,461	\$118,521
Net Change	\$4,610	\$36,580	\$38,467	\$73,511	\$82,731	\$119,311	\$128,531	\$162,410	\$171,630	\$208,210	\$1,025,992

Variable	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total
Agricultural Zoned	(\$331)	(\$380)	(\$394)	(\$443)	(\$457)	(\$506)	(\$521)	(\$569)	(\$584)	(\$633)	(\$4,817)
Residential Zoned	(\$1,048)	(\$1,202)	(\$1,248)	(\$1,402)	(\$1,449)	(\$1,602)	(\$1,649)	(\$1,803)	(\$1,849)	(\$2,003)	(\$15,255)
Sub-Total	(\$1,379)	(\$1,581)	(\$1,643)	(\$1,845)	(\$1,906)	(\$2,108)	(\$2,170)	(\$2,372)	(\$2,433)	(\$2,635)	(\$20,073)
Improved Market Value											
Retail											
Land	\$31,857	\$40,269	\$42,820	\$51,232	\$53,784	\$62,196	\$64,747	\$73,160	\$75,711	\$84,123	\$579,899
Buildings	\$108,204	\$129,845	\$129,845	\$151,485	\$151,485	\$173,126	\$173,126	\$194,767	\$194,767	\$216,408	\$1,623,058
Sub-Total	\$140,060	\$170,114	\$172,665	\$202,718	\$205,269	\$235,322	\$237,874	\$267,927	\$270,478	\$300,531	\$2,202,958
Office											
Land	\$6,490	\$7,079	\$7,669	\$8,259	\$8,849	\$9,439	\$10,029	\$10,619	\$11,209	\$11,799	\$91,443
Buildings	\$47,196	\$51,734	\$56,273	\$60,811	\$65,349	\$69,887	\$74,425	\$78,963	\$83,501	\$88,039	\$676,179
Sub-Total	\$53,686	\$58,814	\$63,942	\$69,070	\$74,198	\$79,326	\$84,454	\$89,582	\$94,710	\$99,838	\$767,622
Industrial											
Land	\$1,941	\$2,363	\$2,785	\$3,207	\$3,629	\$4,051	\$4,473	\$4,895	\$5,317	\$5,739	\$38,399
Buildings	\$24,136	\$26,331	\$28,525	\$30,719	\$32,913	\$35,107	\$37,302	\$39,496	\$41,690	\$43,884	\$340,104
Sub-Total	\$26,077	\$28,694	\$31,310	\$33,926	\$36,542	\$39,158	\$41,775	\$44,391	\$47,007	\$49,623	\$378,502
Net Change	\$218,445	\$256,040	\$266,274	\$303,869	\$314,103	\$351,698	\$361,933	\$399,528	\$409,762	\$447,357	\$3,329,009

Supportable Public Investment @ 5% \$2,256,725



City of Liberty, MO
South Liberty Roadway Study

Supportable Public Investment Analysis

Appendix Table 8:
Retail Sales Tax Revenues and Supportable Public Investment

Variable	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
Net New Sales Tax Revenues	\$0	\$231,493	\$231,493	\$462,987	\$462,987	\$694,480	\$694,480	\$925,974	\$925,974	\$1,157,467	\$5,787,337

Variable	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total	Grand Total
Net New Sales Tax Revenues	\$1,157,467	\$1,388,961	\$1,388,961	\$1,620,454	\$1,620,454	\$1,851,948	\$1,851,948	\$2,083,441	\$2,083,441	\$2,314,935	\$17,362,012	\$23,149,349

Supportable Public Investment @	5%	\$12,103,000
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Source: Economics Research Associates

APPENDIX E:

SOUTH LIBERTY PARKWAY CORRIDOR 2005 MARKET AND VALUE CAPTURE ANALYSIS UPDATES



Economics Research Associates

Memorandum

Date: September 16, 2005
To: Kevin Wallace, HNTB
From: Economics Research Associates
RE: South Liberty Roadway Corridor Market Analysis

Introduction

Economics Research Associate (ERA) was retained by HNTB and the City of Liberty to analyze potential land use impacts associated with the South Liberty Roadway, a four-mile corridor that will connect U.S. Interstate 35 with State Highway 291. This memorandum summarizes ERA's market and economic analysis and presents our key findings regarding commercial real estate market trends including an examination of existing office, industrial and retail supply, and current occupancy and performance patterns. This analysis also includes an examination of expected regional demand growth and estimates regarding how such demand will be allocated to the corridor.

This memorandum is the first of three deliverables and is intended to inform subsequent phases of work. Phase II will be land use projections and development scenarios developed by HNTB. These projections will, in turn, be used to inform Phase III, an analysis of the development economics and supportable land values.

This memorandum is divided into five sections as follows:

- Project Overview
- Demographic & Economic Profile
- Real Estate Market Conditions
- Transportation, Access, & Capital Improvements
- Trade Area Demographics & Consumer Spending Patterns

Project Overview

The City of Liberty is located approximately fifteen miles northeast of Downtown Kansas City at the junctions of U.S. Interstate 35 and I-435, which form Kansas City beltway. Although proximate to Downtown with immediate beltway access, Liberty has maintained an identity distinct from the larger metropolitan region. Liberty is the county seat of Clay County, Missouri. Surrounded by farmland and open space, it has historically functioned as the county's rural trade center with growth and development concentrated in nodes surrounding the

historic downtown square and more recent strip center development located around key highway interchanges.

According to regional planners at the Mid-America Regional Council (MARC), the metropolitan planning organization for the Kansas City region, this is fairly typical for land development in the Northland. Unlike the sprawling suburbs to the south of Downtown Kansas City that are fully integrated into the metropolitan region, north of the river has been relatively slow to develop and has, until recently, been characterized by independent retail nodes that serve individual municipalities, as opposed to expansive developments that serve the regional market. This has resulted in what regional planners recognize as a deficiency in east-west connectors in the Northland.

The South Liberty Roadway will begin to address this deficiency by connecting two key north-south thoroughfares providing an east-west connection between Interstate Highway 35 to State Highway 291 improving regional access to and from Liberty. Further, the roadway will open development opportunities in the southern portion of the city where development has historically been limited by lack of transportation infrastructure. This area includes over forty percent of the city's developable land. With the addition of the South Liberty Roadway, Liberty is poised to capture a higher proportion of metropolitan growth now captured in the I-35 corridor and surrounding Clay County. As such, the roadway has the potential to significantly alter development patterns in Liberty and enhance the city's position within the region.

Demographic & Economic Profile

As the basis for analyzing development opportunities in the South Liberty Roadway corridor, ERA examined demographic and economic conditions in the City of Liberty, Clay County and the Kansas City Metropolitan Statistical Area (MSA). This profile focuses on those variables that drive demand for various uses including commercial office and retail space, and industrial land uses. These include population and household trends, household income growth, and employment trends and forecasts.

Relevant data are detailed in Tables 1 through 6 in the Appendix.

Population & Household Characteristics (Appendix Tables 1-3)

- MARC provides regional population estimates and forecasts for the eight county region. According to MARC, the Kansas City region is expected to grow by 31 percent between 2000 and 2030, adding 530,000 new residents over the thirty-year period.
- The majority of this growth will be captured in the southwest quadrant of the region, with Johnson County projected to add 283,000 over the next 30 years, becoming the largest county in the region. Clay County will be the second fastest growing county in the region, adding 76,300 new residents over the same 30-year time period.
- While MARC does not forecast population growth for individual municipalities, U.S. Census data indicates that the City of Liberty is growing at a rate faster than the region as a whole. Between 1990 and 2000, Liberty gained approximately 2,300 residents,

representing a growth rate of nearly 30 percent. In 2000, Liberty was home to approximately 26,000 residents in more than 9,500 households. Assuming that this rate of growth is sustained over the next 20 to 30 years, the City of Liberty could reach a population of nearly 55,000 by 2030—nearly doubling its current population of 26,000, representing a growth rate of 109 percent.

- At \$52,745, median household income in Liberty is higher than Clay County as a whole (\$48,347), and significantly higher than the Kansas City MSA (\$46,193). From 1990 to 2000 household income in Liberty increased by 45 percent indicative of a community that is increasingly affluent.

Housing Characteristics (Appendix Tables 4-6)

- Single-family detached housing dominates Liberty's housing stock. According to U.S. Census data, less than 20 percent of the city's housing units are in multi-family buildings. Since 1990 the number of multifamily units has decreased and virtually no new multi-family structures have been built since 1999.
- Nearly 70 percent of housing units in Liberty are owner-occupied. This high rate of homeownership is consistent with Clay County but much higher than the Kansas City MSA (55 percent).
- From 1990 to 2000, the median home value in Liberty increased from \$76,600 to \$121,600—an increase of 59 percent. Median home values in Liberty exceed Clay County and the Kansas City MSA again suggesting that Liberty is relatively more affluent.
- Residential development throughout the Kansas City metro region has historically been characterized by low-density, suburban-style, single-family homes. Population trends show that the region is continuing to spread out, not only occupying more land, but thinning out into less-dense, sparsely populated areas. According to the MARC Transportation Outlook 2030, population density has decreased from just over 3,000 persons per square mile in 1970 to a forecast density of less than 2,000 persons per square mile by 2030. This will have consequences for small towns like Liberty where undeveloped, rural land remains available.

Employment Trends & Projections (Appendix Table 7 & 8)

A critical barometer in evaluating demand for real estate is employment growth. The following highlights relevant employment trends and/or forecasts for the Kansas City metropolitan area and Clay County, as provided by various sources, including MARC, the U.S. Bureau of Labor Statistics and Woods & Poole, Inc., a demographic forecasting service.

- Employment levels in all counties in the Kansas City region are expected to increase annually through the year 2030. The largest increase in terms of net new jobs is expected to occur in Johnson County (approximately 278,000), followed closely by Jackson County (approximately 160,600). Platte, Cass and Ray Counties, all in the Northland, are expected

to have the most rapid percentage increase in jobs—58, 83 and 83 percent, respectively—over the 30-year period.

- While the number of jobs in the region is expected to increase steadily, the types of jobs continue to change. For example, service jobs are expected to grow, while manufacturing jobs are projected to decline.
- As illustrated in Appendix Table 8, nearly 27,000 new jobs were created in Clay County throughout the 1990s. By 2000 the county included approximately 111,000 workers, the majority employed in services (29 percent) and wholesale and retail trade (27 percent).
- Between 2000 and 2010, Woods & Poole estimates that county employment will increase by nearly 24,000 employees—representing an annual growth rate of just over 2 percent. Growth is forecasted to occur in the services and wholesale and retail trade sectors—estimated at 11,300 and 6,100 respectively—and will translate into demand for commercial and industrial real estate.

Real Estate Market Conditions

ERA examined market conditions and characteristics for commercial real estate development including office, retail and industrial uses. This section analyzes current inventory, rental and vacancy rates, historical development and absorption trends, and other appropriate potential supply and demand factors as they affect development opportunities in the South Liberty Roadway corridor.

ERA notes that the City of Liberty is currently undergoing an update of their comprehensive plan, which has the potential to alter future land development within the city, particularly the South Liberty Roadway corridor study area. In particular, decisions regarding the proposed Traditional Neighborhood Development (TND) ordinance will affect future residential densities and alter some assumptions regarding commercial land development patterns. However, the analysis of current real estate market conditions below is designed to provide a snapshot of existing conditions. A more detailed analysis of how changes to the comprehensive plan may affect demand for commercial real estate will be considered in subsequent analyses.

Relevant real estate data are illustrated in Appendix Tables 9 through 16.

Office Market Characteristics (Appendix Tables 9-12)

According to data provided by CoStar Group, a national provider of commercial real estate information, the Kansas City regional office market includes approximately 70.1 million square feet of space in twenty submarket areas. ERA notes that CoStar defines the regional market by a larger geography than local commercial real estate brokers Cohen-Esrey, Grubb and Ellis/The Winbury Group and Colliers Turley Martin Tucker, which report regional office inventory to be between 37 and 38 million square feet in just eight submarkets.

Metro Kansas City

Regionally, the Kansas City office market remains stable with improvements anticipated for 2005. Specifically, we note the following:

- Regional office vacancy rates have held steady for the past five quarters in the range of 20 to 21 percent;
- Vacancy varies widely by submarket ranging from a low of 13.1 percent in the Plaza/Midtown submarket to a high of 23.9 percent in the Downtown/Crown Center submarket;
- South Johnson County is metro-Kansas City's largest office submarket with 12.4 million square feet of Class A and B space, followed by Downtown/Crown Center with 10.89 million square feet;
- In recent years, metro-area office space absorption has been weak, but has steadily improved since the severe downturn that began in 1999—the result of Sprint downsizing and vacating 2.7 million square feet of space between 1999 and 2002;
- Cumulative net change in occupied square feet from third quarter 2002 to third quarter 2004 was just over 355,600, or an annual average of approximately 118,500, leading local commercial real estate firms (Colliers Turley Martin Tucker and Grubb & Ellis/The Winbury Group) to describe net absorption as stagnant for a market that includes over 70 million square feet of space;
- Throughout 2004 lease rates have been flat with average asking rate for Class A and Class B space at \$19.11. Effective rates, however, are significantly below asking rent due to reduced rates and concessions offered during negotiations in order to draw tenants into the market;
- Despite current high vacancy rates in the Downtown/Crown Center submarket, more new office development will be concentrated there than in any other submarket in the region. A variety of Downtown projects appear to be influencing companies' decisions to locate downtown including public initiatives to expand downtown's residential base, the creation of a new entertainment district and a new downtown arena—all of which will make Downtown a much more appealing location for office users.

Northland Submarket

According to CoStar Group the Northland office submarket includes four Missouri counties—Platte, Clay, Ray and Clinton. This geography contains approximately 6.8 million square feet of office space in 234 properties accounting for less than 10 percent of the metro area's total. Historically, the Northland has been a less than prominent office location. Dominated by firms that provide business and professional support to the Kansas City International Airport (KCI), the submarket is characterized by Class B and C space.

We also note the following:

- The Northland market area includes just four Class A properties. However, at \$22.50 per square foot the few Class A properties it offers command rental rates on par with some of the more sought-after locations in the region.
- At \$16.47 per square foot, average lease rates for Class B properties in the Northland are among the lowest in the region, far below the metro area average of \$19.11;
- In recent years net absorption has been minimal or negative. In late 2003, the Northland took a large hit when Farmland Industries declared bankruptcy and vacated their 240,000 square foot headquarters building. Although this space was absorbed by second quarter 2004, the market is expected to close 2004 with zero to negative net absorption.

City of Liberty & Clay County

- According to CoStar Group, the Clay County office market includes about 4 million square feet of space, primarily in B and C class office properties. Over half the office properties in the Northland submarket are located in Clay County (59 percent) and all four Class A properties are in Clay. Rates range from \$16.49 per square foot for Class B space to \$22.50 per square foot for Class A space.
- As of the writing of this report, the Clay County office market is likely to end the year with negative absorption of 158,000 square feet. Over the past four years (since year end 2000) absorption has been positive.
- The City of Liberty contains just over 670,000 square feet of office space—comprising nearly 20 percent of the Clay County total and 10 percent of the Northland submarket total. The 43 properties surveyed by CoStar Group are nearly evenly split between Class B and C space. However, at \$19.30 per square foot, average annual lease rates are well above B and C class rates elsewhere in the region.
- In recent years office absorption in Liberty has been minimal to negative.

Industrial Market Characteristics (Appendix Tables 13-16)

At the end of 2003 Kansas City's industrial market totaled 165 million square feet and included products types such as distribution centers, manufacturing, office/warehouse and flex space. Colliers Turley Martin Tucker describes recent activity in the regional industrial market as "lackluster" noting the construction of industrial properties has slowed and market movement has been more sideways than up and down. The regional vacancy rates is 11.7 percent and year to date absorption is negative 650,000 square feet.

North of the River Submarket

The North of the River submarket, which includes the Missouri counties of Clay and Platte, contains nearly 42 million square feet of industrial space. Throughout 2004 this submarket has sustained vacancy rates between 12 and 13 percent, slightly higher than the regional average.

Average lease rates have ranged from \$4.77 per square foot (triple net) in the first quarter of 2004 to \$4.17 by third quarter 2004.

Retail Market Characteristics (Appendix Tables 17 & 18)

Metro Kansas City & the Northland Submarket

According to Grub and Ellis/The Winbury Group's current Kansas City Regional Retail Market Report, retail remains the most active property type in the commercial real estate market. Although the pace of retail development slowed somewhat in 2002, it accelerated again in 2003, a trend which has continued throughout 2004. Currently, there is approximately 67.7 million square feet of retail space in the Kansas City region, with an estimated three million square feet under construction and six million square feet planned or proposed throughout the metro area.

The region includes ten submarkets with the City of Liberty falling into what is considered the Kansas City North area, or the Northland, which includes the Missouri counties of Platte and Clay. This is the second largest retail submarket in the region behind Johnson County containing approximately 15.6 percent of region's total retail space.

In recent years, the entire Kansas City region has experienced an enormous infusion of big-box retail driven by home improvement stores, discount and wholesale clubs. Much of this retail development has been concentrated in the Northland. Since 2000, the Barry Road corridor, a 10-mile stretch between the I-29 and the I-35 interchanges, has emerged as an important retail node. Spreading across Platte and Clay Counties, this area has witnessed the development of several large shopping centers including the Barry North Center (360,000 SF) and Liberty Town Center (140,000 SF).

This infusion of new retail has had a negative effect on vacancy rates for existing retail, especially in the Northland. While overall retail market vacancy remains at a healthy 3.6 percent, the shift in demand from tradition retail to larger power centers and lifestyle centers has taken a toll on smaller, strip shopping centers, which are rapidly becoming obsolete. Of the more than 11 million square feet of strip shopping centers, nearly 6 percent are vacant. Several traditional shopping centers in the Northland report vacancy rates of 8 to 10 percent.

We also note the following:

- Lease rates in Kansas City North submarket range from \$11 to \$21 per square foot. Only South Johnson County has higher rental rates for retail.

- According to local commercial real estate developers, the Kansas City Northland submarket represents an attractive opportunity for retail development. Historically the Northland area, characterized by suburban neighborhoods and farmland, has not experienced the same amount of retail growth as the areas south of Kansas City such as Johnson County where retail development has been booming for years. But the Northland, with its improving transportation arteries is considered by some to be the most strategic new area for retail development.
- As noted above, the I-29 spine between downtown and KCI Airport is emerging as a prime retail corridor, particularly the area known as the Barry Road corridor, home to two of the regions premier retail developments: Zona Rosa and The Shops at Boardwalk.
- In 2003, Platte County took what is considered an aggressive step for Missouri counties when voters approved a transportation plan to improve some of the area's most congested intersections—specifically, the North Congress and North Green Hills road, near the Barry Road and I-29 interchange. Work is currently underway to widen these older, two lane roads in order to relieve congestion spurred by recent commercial development.

New retail centers in the Northland include:

- ***The Shops at Boardwalk*** is an open-air lifestyle center located on the southeast quadrant of the intersection of I-29 and Missouri Highway 152, an area known as Kansas City, North. The 136,000 square-foot center opened in 2002 and is home to a high-end retailers, including Borders Books and Music, Chico's, Chipotle, Coldwater Creek, J. Jill, Jos A. Bank, Nextel Communications, Planet Sub and Yankee Candle. The highlight of the project is the upscale mix of tenants and the open-air streetscape that creates a pedestrian friendly environment with quality landscaping and other amenities. In September of this year (2004) the center was sold to Inland Real Estate Acquisitions, Inc., a privately-owned real estate investment trust (REIT). Inland paid \$36 million for the center—more than \$290 a square foot—one of the highest prices ever paid for a retail property in the Kansas City area. Other retail property sales in metropolitan Kansas City ranged from less than \$3 a square foot for Bannister Mall in south Kansas City to almost \$140 a square foot for New Mark Center in Kansas City, North.
- ***Barry Woods Crossing***, a traditional power center located in the Barry Road corridor in Platte County opened in 1998. The 270,000 square foot center includes typical power center tenants including Barnes and Noble, Bed, Bath & Beyond, Old Navy, and OfficeMax. Cohen-Esrey, the leasing agent and management company for the center, reports average lease rate to be \$13.50 per square foot and productivity levels average sales of \$300 per square foot.
- ***Barry North Center*** is a regional strip center that opened in 2001 located in the Clay County portion of the Barry Road retail area. A 135,000-square foot Home Depot and 220,000-square foot WalMart Supercenter anchor the center. According to leasing agent and owner R.H. Johnson Company the center is fully leased. Lease rates and average sales per square foot were not disclosed.

- **Zona Rosa**, located at the northwest corner of Interstate 29 and Barry Road opened in May of 2004; 93 acres of New Urban Retail 80 tenants including Barnes & Noble, Dick's Sporting Goods, Victoria's Secret, Abercrombie & Fitch, Aeropostale and Express. First phase includes 400,000 square feet of retail, 24 apartment units, and 150,000 square feet of office and a four-screen Majestic Premier Theater; developer is Steiner + Associated would developed Easton Town Center
- **Tuileries Plaza** located in Platte County at the corner of North Cosby Avenue and 64th Street in Kansas City. 35-acre development planned to include banks, restaurants, a grocery, drug store and office buildings. It will also feature 15 acres of residential, condominiums and a biking/hiking trail.

City of Liberty & Clay County

- According to the National Research Bureau (NRB) Shopping Center Directory, Clay County includes approximately 5.4 million square feet of neighborhood, community and regional retail space. Nearly 25 percent of existing retail was built prior to 1960 and is characterized by strip centers and value-oriented retail.
- The City of Liberty includes six neighborhood and community-oriented shopping centers. Nearby, Kansas City has developed Liberty Center, a large regional center totaling just over one million square feet. It includes well over 500,000 of retail space anchored by a 130,000 square foot Home Depot. The center was built in 1999 is located on M-152 in KCMO.
- Average retail rents in Clay County range from \$6 for older, neighborhood centers to \$10 to \$15 a square foot for newer community shopping centers. Liberty Corners Shopping Center and Liberty Center command the highest retail rates at \$15 per square foot, according to the Shopping Center Directory.

Observing the Kansas City regional retail market, we note that the Clay County represents less than 10 percent of the market and is currently considered a less than prime location. Further, some of the older retail centers in the Clay County/Liberty submarket report a vacancy rates approaching 10 percent—far above the regional average of 3.6 percent and low sales productivity levels. Within a different regional context, these factors would represent a challenging market for additional retail development in Liberty. However, the vibrancy of the Kansas City regional retail market and the success of recently opened centers in neighboring Platte County coupled with anticipated population and housing growth in Liberty suggests the market will support additional retail development. Several local brokers interviewed over the course of the study believe that roof top growth alone will be substantial enough to drive additional retail development in coming years.

Transportation, Access, & Capital Improvements

The Kansas City metro area possesses one of the most extensive roadway systems in the nation. According the Federal Highway Administration, the region has the most freeway miles per person of all urbanized areas with populations greater than 500,000 and the fourth highest

total roadway miles per person. While MARC notes modest increases in transit ridership in recent years, the metro area remains largely auto-dependent and transportation access is a critical factor in all land development issues.

Liberty enjoys easy access to the region's major transportation outlets including Interstate 35, a major north-south corridor, and Interstate 70, a major east-west corridor just 15 miles away. Kansas City International Airport is 20 miles west of the city and the nearest rail facility is ten miles away. The South Liberty Roadway in particular is supported by Hughes, Withers, and Birmingham Roads, which provide north-south access in the corridor. Ruth Ewing Road and Liberty Drive provide east-west access. According to MARC, Interstate Highway 35, U.S. 69, Liberty Drive, and State Highway 291 have the highest traffic volumes in the area. Average daily traffic volumes on Interstate Highway 25 and State Highway 291 are about 56,000 and 22,500, respectively.

The major recent capital improvement project in the Liberty has been the I-35 and State Highway 152 interchange project which widened the existing bridge, included new city road construction, and some reconfiguration of existing city roads.

MARC recently submitted a proposal to the Missouri Department of Transportation (MoDOT) that would establish a study area around the I-35 corridor in Clay County. Although specific parameters remain undefined at the writing of this report, the goal of the study is to lay out a long-range plan for the area. It will likely entail an examination existing roadway conditions and propose recommendations regarding short-term, modest improvements limited to road maintenance and pavement replacement. Major changes to the character and alignment of the road are not anticipated.

Over the next decade, other long-term capital improvements likely to affect the South Liberty Roadway Corridor are improvements to the Paseo Bridge, the main bridge connecting north and south of the river. According to local planners and land developers, the river has long been a barrier between the north and the south, not only physically, but psychologically, as well. Current congestion problems at the bridge have reinforced that divide. Improvements to the bridge designed to relieve congestion will serve to enhance the connection between north and south and stand to change development dynamics substantially by bringing the two sides of the river together.

Trade Area Demographics

In any market analysis, a "trade area" is defined as the geographic area from which a commercial business district draws its primary source of market support. Trade areas differ based on a district's overall size, retail and business mix, physical and locational considerations such as natural barriers, highway access, visibility, behavioral characteristics, market competition, and many other factors. Demographic characteristics of the South Liberty Roadway corridor trade area were examined within a five-mile radius of the mid-point of the planned roadway in order to capture an accurate snapshot of demographics and distinctions unique to this trade area.

- As discussed above, both Clay County and Liberty are growing in population and number of households. This is also true for the five-mile trade area described above. According to ESRI Business Information Solutions, the area within this five-mile radius will add almost 4,000 new residents between 2003 and 2008.
- These new residents will be accommodated in 16,000 owner-occupied dwelling units and approximately 5,000 renter-occupied dwelling units.

Trade Area Household Incomes & Consumer Spending

- Median annual household income within the trade area is estimated to be \$55,840 in 2008—up over 7 percent from 2003 (\$52,000). This area of Liberty is relatively affluent for the Kansas City region, which overall has an average median income just above \$46,000, as of 2000. Based on an analysis of consumer expenditures, this indicates that significant disposable income from trade area households is available to support retail and other consumer expenditures in the South Liberty study and elsewhere in the vicinity.
- According to ESRI, Inc., a demographic forecasting service, households in this trade area spend an average of \$20,600 per year in various retail categories, including: GAFO (i.e., merchandise typically found in shopping centers, otherwise known as General Merchandise, Apparel & Accessories, Furniture/Home Furnishings, and Other). This also includes consumer spending on groceries, restaurants, and leisure and entertainment. ERA notes that this is below the national average (\$24,241) among standard merchandise categories characteristic of commercial retail districts. (Household spending data are illustrated in Appendix Table 20).
- The \$395 million in annual “buying power” of trade area households supports almost 1.8 million sq. ft. of retail space—irrespective of location. That is, these expenditures can be made anywhere. This assumes average annual sales productivity of \$225 per sq. ft., which reflects an industry average across various categories of retail space—from neighborhood centers to specialty districts to super-regional malls.

Appendix Table 1
Kansas City Region, Population Estimates, 1990-2030
South Liberty Roadway Corridor

Jurisdiction	1990	2000	2010	2020	Change 2000-2030	
					2030	No. %
Kansas City Region	1,511,740	1,695,764	1,894,399	2,064,872	2,226,154	530,390 31%
Jackson	633,232	654,857	684,840	702,429	719,372	64,515 10%
Johnson	355,054	451,086	550,904	644,559	733,334	282,248 63%
Clay	153,411	184,006	212,386	236,914	260,275	76,269 41%
<i>City of Liberty (1)</i>	<i>20,500</i>	<i>26,230</i>	<i>33,562</i>	<i>42,942</i>	<i>54,945</i>	<i>28,715 109%</i>
Wyandotte	162,026	157,901	157,417	154,800	151,816	-6,085 -4%
Cass	63,808	82,092	101,004	119,018	135,942	53,850 66%
Platte	57,867	73,781	88,432	101,488	113,752	39,971 54%
Leavenworth	64,371	68,695	75,032	80,471	85,715	17,020 25%
Ray	21,971	23,346	24,383	25,192	25,948	2,602 11%

dna=data not available

(1) Source for City of Liberty 1990 & 2000 population is U.S. Census; projections for 2010, 2020, & 2030 are ERA projections based on historic growth rates.

Source: Mid-America Regional Council; U.S. Census Bureau; Economics Research Associates, November 2004.

Appendix Table 2
Kansas City Region, Household Estimates, 1990-2030
South Liberty Roadway Corridor

Jurisdiction	1990	2000	2010	2020	Change 2000-2030	
					2030	No. %
Kansas City Region	582,198	664,378	760,761	850,170	939,732	275,354 41%
Jackson	252,202	266,294	286,908	303,467	320,071	53,777 20%
Johnson	136,699	174,570	217,386	258,944	300,556	125,986 72%
Clay	58,998	72,558	86,005	98,523	111,060	38,502 53%
City of Liberty (1)	7,175	9,510	12,605	16,707	22,144	12,634 133%
Wyandotte	61,470	59,698	60,330	60,662	61,004	1,306 2%
Cass	22,988	30,168	38,243	46,433	54,634	24,466 81%
Platte	22,116	29,278	36,282	43,070	49,867	20,589 70%
Leavenworth	19,650	23,073	26,203	29,050	31,902	8,829 38%
Ray	8,075	8,739	9,405	10,021	10,638	1,899 22%

dna=data not available

(1) Source for City of Liberty 1990 & 2000 population is U.S. Census; projections for 2010, 2020, & 2030 are ERA projections based on historic growth rates.

Source: Mid-America Regional Council; Economics Research Associates, November 2004.

Appendix Table 3
Median Household Incomes by Jurisdiction, 1990-2000
South Liberty Roadway Corridor

Jurisdiction	1990	2000	Change 2000-2030	
			No.	%
Kansas City Region	\$ 31,613	\$ 46,193	14,580	46%
Jackson	\$ 27,853	\$ 39,277	11,424	41%
Johnson	\$ 23,044	\$ 35,391	12,347	54%
Clay	\$ 34,370	\$ 48,347	13,977	41%
City of Liberty (1)	\$ 36,388	\$ 52,745	16,357	45%
Wyandotte	\$ 23,780	\$ 33,784	10,004	42%
Cass	\$ 31,373	\$ 49,562	18,189	58%
Platte	\$ 38,173	\$ 55,849	17,676	46%
Leavenworth	\$ 32,500	\$ 48,144	15,644	48%
Ray	\$ 27,124	\$ 41,886	14,762	54%

dna=data not available

(1) Source for City of Liberty 1990 & 2000 population is U.S. Census; projections for 2010, 2020, & 2030 are ERA projections based on historic growth rates.

Source: Mid-America Regional Council; Economics Research Associates, November 2004.

Appendix Table 4
2000 Units in Structure, City of Liberty, Clay County, Kansas City MSA
South Liberty Roadway Corridor

Units in Structure	City of Liberty		Clay County		Kansas City MSA	
	No.	% Distrib.	No.	% Distrib.	No.	% Distrib.
1-unit, detached	7,128	75%	54,346	73%	515,776	71%
1-unit, attached	530	6%	3,092	4%	34,498	5%
2 units	285	3%	1,608	2%	23,441	3%
3 or 4 units	149	2%	2,962	4%	32,588	5%
5 to 9 units	461	5%	4,814	7%	39,018	5%
10 to 19 units	533	6%	4,297	6%	34,336	5%
20 or more units	370	4%	2,858	4%	42,959	6%
Total (1)	9,456	100%	73,977	100%	722,616	100%

(1) Excludes mobile homes.

Source: U.S. Census Bureau; Economics Research Associates, November 2004.

Appendix Table 5
Median Home Value, City of Liberty, Clay County, Kansas City MSA, 1990 & 2000
South Liberty Roadway Corridor

	Median Home Value		% Change 1990-2000
	1990	2000	
Kansas City MSA	\$ 66,000	\$ 104,700	59%
Clay County	\$ 68,200	\$ 104,900	54%
City of Liberty	\$ 76,600	\$ 121,600	59%

Source: U.S. Census Bureau; Economics Research Associates, November 2004.

Appendix Table 6
Residential Building Permits Issued, 1996-2004 (YTD)
South Liberty Roadway Corridor

Single-Family Permits

	1996	1997	1998	1999	2000	2001	2002	2003	2004 (1)	Annual Average
Kansas City MSA	8,892	8,558	9,303	10,308	8,224	8,675	10,067	10,727	8,427	9,242
Clay County	1,525	1,195	1,391	1,519	1,284	1,259	1,606	2,019	972	1,419
City of Liberty	227	154	206	259	208	184	215	233	146	204

City of Liberty as percent of:

Kansas City MSA	3%	2%	2%	3%	3%	2%	2%	2%	2%	2%
Clay County	15%	13%	15%	17%	16%	15%	13%	12%	15%	14%

Multi-Family Permits

	1996	1997	1998	1999	2000	2001	2002	2003	2004 (1)	Annual Average
Kansas City MSA	dna	3,979	3,636	5,163	4,287	5,535	3,587	3,379	1,684	3,906
Clay County	466	475	591	430	125	252	633	530	190	410
City of Liberty	48	100	50	43	2	2	0	0	0	27

City of Liberty as percent of:

Kansas City MSA	dna	3%	1%	1%	0%	0%	0%	0%	0%	1%
Clay County	10%	21%	8%	10%	2%	1%	0%	0%	0%	7%

dna=data not available

(1) Permits issued through August 2004.

Source: Mid-America Regional Council; Economics Research Associates, November 2004.

Appendix Table 7
Regional Employment Estimates, Kansas City Metro Area, 1990-2030 (1)
South Liberty Roadway Corridor

Jurisdiction	1990	2000	2010	2020	Change 2000-2030	
					2030	No. %
Kansas City Region	946,780	1,166,709	1,426,048	1,658,801	1,773,116	606,407 52%
Jackson	442,089	479,203	543,781	609,217	639,868	160,665 34%
Johnson	241,291	364,721	487,210	590,731	642,695	277,974 76%
Clay	83,266	110,495	138,690	164,453	177,485	66,990 61%
City of Liberty	<i>dna</i>	<i>dna</i>	<i>dna</i>	<i>dna</i>	<i>dna</i>	<i>dna</i>
Wyandotte	92,017	94,594	104,745	113,826	117,751	23,157 24%
Platte	32,114	44,347	58,730	71,443	77,922	33,575 76%
Leavenworth	28,960	32,941	37,505	41,306	43,346	10,405 32%
Cass	20,533	30,992	42,707	52,164	56,837	25,845 83%
Ray	6,510	9,416	12,680	15,661	17,212	7,796 83%

dna=data not available

(1) Employment is measured by the number of full- and part-time jobs in an area. It includes farm workers and the self-employed as well as the non-agricultural wage and salary workers. The employment levels are measured where the jobs are (place-of-work) rather than where the workers live (place of residence).

Source: Mid-America Regional Council; Economics Research Associates, November 2004.

Appendix Table 8
Employment Trends & Projections for Clay County, 2000-2025
South Liberty Roadway Corridor

CATEGORY	1990	2000	2005	2010	2015	2020	2025	2030	CHANGE: 2005-2025		
									No.	%	CAGR
Employment by Sector											
Agriculture	1,357	1,555	1,601	1,648	1,697	1,746	1,790	1,835	189	11.8%	0.3%
Mining & Construction	3,998	5,966	6,504	6,909	7,309	7,704	8,083	8,481	1,579	24.3%	0.7%
Manufacturing	16,762	16,604	16,767	16,983	17,158	17,311	17,458	17,606	691	4.1%	0.1%
Transportation/Comm/Public Utilities	4,220	5,188	5,411	5,582	5,683	5,720	5,693	5,666	282	5.2%	0.4%
Wholesale & Retail Trade	23,566	30,320	33,534	36,485	39,350	42,095	44,673	47,409	11,139	33.2%	0.9%
Finance/Insurance/Real Estate	4,645	6,383	7,262	8,151	9,072	10,015	10,967	12,009	3,705	51.0%	1.2%
Services	20,455	32,239	37,672	43,546	49,910	56,650	63,631	71,472	25,959	68.9%	1.5%
Government	9,085	12,672	14,083	15,429	16,796	18,163	19,498	20,931	5,415	38.5%	1.0%
TOTAL:	84,088	110,927	122,834	134,733	146,975	159,404	171,793	185,145	48,959	39.9%	1.0%
Annual % Change											

Source: Woods and Poole; Economics Research Associates, November 2004.

Appendix Table 9
North of the River Office Market Trends, 2000 Q4-2004 QTD
South Liberty Roadway Corridor

	Existing Inventory			Delivered Inventory			TOTAL OCCUPIED	TOTAL VACANCY %	NET ABSORPTION
	# of Buildings	RENTABLE SPACE (SF)		# of Buildings	RENTABLE SPACE (SF)				
Current	236	6,845,717		4	33,450		5,788,503	15%	15,903
2004 Q3	232	6,812,267		2	11,400		5,772,600	15%	(2,000)
2004 Q2	230	6,800,867		1	32,000		5,774,600	15%	37,263
2004 Q1	229	6,768,867		0	0		5,737,337	15%	(103,478)
Annual Absorption to date, 2004									
									(52,312)
2003 Q4	229	6,768,867		1	200,390		5,840,815	14%	(235,051)
2003 Q3	228	6,568,477		4	150,400		6,075,866	7%	154,859
2003 Q2	224	6,418,077		1	6,500		5,921,007	8%	37,167
2003 Q1	223	6,411,577		0	0		5,883,840	8%	21,753
Annual Absorption, 2003									
									(21,272)
2002 Q4	223	6,411,577		1	10,000		5,862,087	9%	35,849
2002 Q3	222	6,401,577		1	7,200		5,826,238	9%	(6,855)
2002 Q2	221	6,394,377		1	5,500		5,833,093	9%	(41,561)
2002 Q1	220	6,388,877		0	0		5,874,654	8%	(46,927)
Annual Absorption, 2002									
									(59,494)
2001 Q4	220	6,388,877		2	117,665		5,921,581	7%	147,017
2001 Q3	218	627,212		1	32,000		5,774,564	-821%	(48,671)
2001 Q2	217	6,239,212		0	0		5,823,235	7%	(39,028)
2001 Q1	217	6,239,212		4	271,558		5,862,263	6%	168,413
Annual Absorption, 2001									
									227,731
2000 Q4	213	5,967,654		0	0		5,693,850	5%	(53,311)
2000 Q3	213	5,967,654		0	0		5,747,161	4%	0
Absorption, 3rd & 4th Quarter 2000									
									0
% Change:									
2000-2004	10.8%	14.7%		23	878,063		0.7%		
Absorption 2000 (Q3) to 2004 (YTD):									
Average Annual Absorption:									41,342
									21,034

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Appendix Table 10
Clay County Office Market Trends, 2000 Q4-2004 QTD
South Liberty Roadway Corridor

Existing Inventory			Delivered Inventory						
# of Buildings	RENTABLE SPACE (SF)		# of Buildings	RENTABLE SPACE (SF)		TOTAL OCCUPIED	TOTAL VACANCY %	NET ABSORPTION	
Current	176	4,056,560	3	18,000	3,691,833	9%	8,475		
2004 Q3	173	4,038,560	1	72	3,683,358	9%	18,598		
2004 Q2	172	4,031,360	1	32,000	3,664,760	9%	(12,328)		
2004 Q1	171	3,999,360	0	0	3,677,088	8%	(172,631)		
Annual Absorption to date, 2004									
							(157,886)		
2003 Q4	171	3,999,360	1	200,390	3,849,719	4%	227,792		
2003 Q3	170	3,798,970	4	150,400	3,621,927	5%	175,905		
2003 Q2	166	3,648,570	1	6,500	3,446,022	6%	48,731		
2003 Q1	165	3,642,070	0	0	3,397,291	7%	(3,792)		
Annual Absorption, 2003									
							452,428		
2002 Q4	165	3,642,070	0	0	3,401,083	7%	77,524		
2002 Q3	165	3,642,070	0	0	3,323,559	9%	(8,668)		
2002 Q2	165	3,642,070	0	0	3,332,227	9%	(50,826)		
2002 Q1	165	3,642,070	0	0	3,383,053	7%	(3,959)		
Annual Absorption, 2002									
							18,030		
2001 Q4	165	3,642,070	2	117,665	3,387,012	7%	92,545		
2001 Q3	163	3,524,405	1	32,000	3,294,467	7%	(37,488)		
2001 Q2	162	3,492,405	0	0	3,331,955	5%	(41,268)		
2001 Q1	162	3,492,405	2	15,558	3,373,223	3%	23,248		
Annual Absorption, 2001									
							13,789		
2000 Q4	160	3,476,847	0	0	3,349,975	4%	(1,555)		
2000 Q3	160	3,476,847	0	0	3,351,530	4%	0		
Absorption, 3rd & 4th Quarter 2000									
							(1,555)		
% Change:									
2000-2004	10.0%	16.7%	16	579,713	10.2%				
Absorption 2000 (Q3) to 2004 (YTD):									
Average Annual Absorption:									
							340,303		
							72,179		

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Appendix Table 11
City of Liberty Office Market Trends, 2000 Q4-2004 QTD
South Liberty Roadway Corridor

	Existing Inventory		Delivered Inventory			TOTAL VACANCY %	NET ABSORPTION
	# of Buildings	RENTABLE SPACE (SF)	# of Buildings	RENTABLE SPACE (SF)	TOTAL OCCUPIED		
Current	43	672,377	3	18,000	643,293	4%	11,160
2004 Q3	40	654,377	1	7,200	632,133	3%	4,881
2004 Q2	39	647,177	0	0	627,252	3%	(2,128)
2004 Q1	39	647,177	0	0	629,380	3%	629,380
Annual Absorption to date, 2004							
							16,166
2003 Q4	39	627,677	0	0	627,127	0%	(5,380)
2003 Q3	39	627,677	2	13,000	632,507	-1%	12,493
2003 Q2	37	627,677	1	6,500	620,014	1%	(6,519)
2003 Q1	36	627,677	0	0	626,533	0%	20,962
Annual Absorption, 2003							
							21,556
2002 Q4	36	627,677	0	0	605,571	4%	(543)
2002 Q3	36	627,677	0	0	606,114	3%	(6,900)
2002 Q2	36	627,677	0	0	613,014	2%	(4,224)
2002 Q1	36	627,677	0	0	617,238	2%	2,200
Annual Absorption, 2002							
							(9,467)
2001 Q4	36	627,677	0	117,665	615,038	2%	2,924
2001 Q3	36	627,677	0	32,000	612,114	2%	10,437
2001 Q2	36	627,677	0	0	601,677	4%	(19,000)
2001 Q1	36	627,677	0	15,558	620,677	1%	(800)
Annual Absorption, 2001							
							(6,439)
2000 Q4	36	3,476,847	0	0	621,477	82%	3,025
2000 Q3	36	3,476,847	0	0	618,452	82%	0
Absorption, 3rd & 4th Quarter 2000							
							3,025
% Change:							
2000-2004	19.4%	-80.7%	7	-2,804,470	4.0%		
Absorption 2000 (Q3) to 2004 (YTD):							
Average Annual Absorption:							24,841
							5,520

Appendix Table 12
Annual Office Market Absorption Selected Kansas City Submarkets, 2000-2004
South Liberty Roadway Corridor

Year	North of the River				Clay County				City of Liberty			
	Space (SF)	Occupied	Absorbed	Space (SF)	Occupied	Absorbed	Space (SF)	Occupied	Absorbed	Space (SF)	Occupied	Absorbed
2004 (YTD)	6,845,717	5,788,503	(52,312)	4,056,560	3,691,833	(157,886)	672,377	643,293	16,166			
2003	6,768,867	5,840,815	(21,272)	3,999,360	3,849,719	448,636	647,177	627,127	21,556			
2002	6,411,577	5,862,087	(59,494)	3,642,070	3,401,083	14,071	627,677	605,571	(9,467)			
2001	6,388,877	5,921,581	227,731	3,642,070	3,387,012	37,037	627,677	615,038	(6,439)			
2000	5,967,654	5,693,850	-	3,476,847	3,349,975	-	627,677	621,477	-			

Source: CoStar Group, Inc., Economics Research Associates, November 2004.

Appendix Table 13
North of the River Industrial Market Trends, 2000 Q4-2004 QTD (1)
South Liberty Roadway Corridor

Existing Inventory				Delivered Inventory				TOTAL OCCUPIED	TOTAL VACANCY %	NET ABSORPTION
# of Buildings	RENTABLE SPACE (SF)	# of Buildings	RENTABLE SPACE (SF)							
Current	679	41,874,538	1	12,500	36,622,753	13%	43,907			
2004 Q3	678	41,862,038	1	86,025	36,578,846	13%	(177,530)			
2004 Q2	677	41,776,013	0	0	36,756,376	12%	174,757			
2004 Q1	677	41,776,013	3	1,734,000	36,581,619	12%	37,293			
Annual Absorption to date, 2004								78,427		
2003 Q4	674	40,042,013	0	0	36,544,326	9%	109,173			
2003 Q3	674	40,042,013	0	0	36,435,153	9%	(152,491)			
2003 Q2	674	40,042,013	0	0	36,587,644	9%	7,485			
2003 Q1	674	40,042,013	0	0	36,580,159	9%	149,263			
Annual Absorption, 2003								113,430		
2002 Q4	674	40,042,013	1	100,000	36,430,896	9%	217,260			
2002 Q3	673	39,942,013	0	0	36,213,636	9%	515,497			
2002 Q2	673	39,942,013	0	0	35,698,139	11%	(598,365)			
2002 Q1	673	39,942,013	3	100,735	36,296,504	9%	(408,903)			
Annual Absorption, 2002								(274,511)		
2001 Q4	670	39,841,278	0	0	36,705,407	8%	(197,311)			
2001 Q3	670	39,841,278	4	615,460	36,902,718	7%	7,126			
2001 Q2	666	39,225,818	1	33,000	36,895,592	6%	(158,753)			
2001 Q1	665	39,192,818	1	2,450	37,054,345	5%	(627,677)			
Annual Absorption, 2001								(976,615)		
2000 Q4	664	39,190,368	2	95,434	37,682,022	4%	(99,797)			
2000 Q3	662	39,094,934	0	0	37,781,819	3%	0			
Absorption, 3rd & 4th Quarter 2000								(99,797)		
% Change:										
2000-2004	2.6%	7.1%	17	2,779,604	-3.1%					
Absorption 2000 (Q3) to 2004 (YTD):								(1,059,269)		
Average Annual Absorption:								(257,570)		

(1) North of the River Submarket includes Airport/N. Platte Co., City of North KC, Claycomo, Liberty, Northeast Clay Co, and Riverside/Parkville.

Source: CoStar Group, Inc., Economics Research Associates, November 2004.

Appendix Table 14
Clay County, Industrial Market Trends, 2000 Q4-2004 QTD
South Liberty Roadway Corridor

Existing Inventory				Delivered Inventory			
# of		RENTABLE		# of		RENTABLE	
Buildings	SPACE (SF)	Buildings	SPACE (SF)	Buildings	SPACE (SF)	TOTAL OCCUPIED	NET ABSORPTION
Current	554	37,127,229	1	12,500	32,366,296	13%	39,163
2004 Q3	553	37,114,729	0	0	32,327,133	13%	(86,008)
2004 Q2	553	37,114,729	0	0	32,413,141	13%	170,801
2004 Q1	553	37,144,729	2	1,654,000	32,242,340	13%	(68,648)
Annual Absorption to date, 2004							55,308
2003 Q4	551	35,460,729	0	0	32,310,988	9%	(79,319)
2003 Q3	551	35,460,729	0	0	32,390,307	9%	(214,339)
2003 Q2	551	35,460,729	0	0	32,604,646	8%	69,722
2003 Q1	551	35,460,729	0	0	32,534,924	8%	191,784
Annual Absorption, 2003							(32,152)
2002 Q4	551	35,460,729	1	100,000	32,343,140	9%	216,823
2002 Q3	550	35,360,729	0	0	32,126,317	9%	527,429
2002 Q2	550	31,598,888	0	0	31,598,888	0%	(602,858)
2002 Q1	550	32,201,746	3	100,735	32,201,746	0%	(346,889)
Annual Absorption, 2002							(205,495)
2001 Q4	547	35,259,994	0	0	32,548,635	8%	(194,529)
2001 Q3	547	35,259,994	3	610,185	32,743,164	7%	29,888
2001 Q2	544	34,649,809	1	33,000	32,713,276	6%	(105,052)
2001 Q1	543	34,616,809	1	2,450	32,818,328	5%	(647,974)
Annual Absorption, 2001							(917,667)
2000 Q4	542	34,614,359	1	38,642	33,466,302	3%	14,962
2000 Q3	541	34,575,717	0	0	33,451,340	3%	0
Absorption, 3rd & 4th Quarter 2000							14,962
% Change:							
2000-2004	2.4%	7.4%	13	2,551,512	-3.2%		
Absorption 2000 (Q3) to 2004 (YTD):							(1,100,006)
Average Annual Absorption:							(241,121)

Appendix Table 15
City of Liberty, Industrial Market Trends, 2000 Q4-2004 QTD
South Liberty Roadway Corridor

Existing Inventory				Delivered Inventory			
# of		RENTABLE		# of		RENTABLE	
Buildings	SPACE (SF)	Buildings	SPACE (SF)	Buildings	SPACE (SF)	TOTAL OCCUPIED	NET ABSORPTION
Current	56	5,182,163	0	0	0	3,334,413	36% 19,240
2004 Q3	56	5,182,163	0	0	0	3,315,173	36% 9,850
2004 Q2	56	5,182,163	0	0	0	3,305,323	36% (5,160)
2004 Q1	56	5,182,163	1	1,500,000	3,310,483	36% 15,800	
Annual Absorption to date, 2004							39,730
2003 Q4	55	3,682,163	0	0	0	3,294,683	11% (30,580)
2003 Q3	55	3,682,163	0	0	0	3,325,263	10% (326,245)
2003 Q2	55	3,682,163	0	0	0	3,651,508	1% (11,400)
2003 Q1	55	3,682,163	0	0	0	3,662,908	1% (135)
Annual Absorption, 2003							(368,225)
2002 Q4	55	3,682,163	0	0	0	3,663,043	1% 15,000
2002 Q3	55	3,682,163	0	0	0	3,648,043	1% (24,900)
2002 Q2	55	3,682,163	0	0	0	3,672,943	0% 0
2002 Q1	55	3,682,163	0	0	0	3,672,943	0% 50,720
Annual Absorption, 2002							(9,900)
2001 Q4	54	3,632,163	0	0	0	3,622,223	0% (8,340)
2001 Q3	54	3,632,163	0	0	0	3,630,563	0% 15,600
2001 Q2	54	3,632,163	0	0	0	3,614,963	0% 0
2001 Q1	54	3,632,163	0	0	0	3,614,963	0% 0
Annual Absorption, 2001							7,260
2000 Q4	54	3,632,163	0	0	0	3,614,963	0% 0
2000 Q3	54	3,632,163	0	0	0	3,614,963	0% 0
Absorption, 3rd & 4th Quarter 2000							0
% Change:							
2000-2004	3.7%	42.7%	2	1,550,000	-7.8%		
Absorption 2000 (Q3) to 2004 (YTD):							(280,550)
Average Annual Absorption:							(73,586)

Appendix Table 16
Annual Industrial Market Absorption Selected Kansas City Submarkets, 2000-2004
South Liberty Roadway Corridor

North of the River						Clay County			City of Liberty			
Year	Space (SF)	Occupied	Absorbed	Space (SF)	Occupied	Absorbed	Space (SF)	Occupied	Absorbed	Space (SF)	Occupied	Absorbed
2004 (YTD)	41,874,538	36,622,753	78,427	37,127,229	32,366,296	55,308	5,182,163	3,334,413	39,730	5,182,163	3,334,413	39,730
2003	40,042,013	36,544,326	113,430	35,460,729	32,310,988	(32,152)	3,682,163	3,294,683	(368,360)	3,682,163	3,294,683	(368,360)
2002	40,042,013	36,430,896	(274,511)	35,460,729	32,343,140	(205,495)	3,682,163	3,663,043	40,820	3,682,163	3,663,043	40,820
2001	39,841,278	36,705,407	(976,615)	35,259,994	32,548,635	(917,667)	3,632,163	3,622,223	457,260	3,632,163	3,622,223	457,260
2000	39,190,368	37,682,022	-	34,614,359	33,466,302	-	3,632,136	3,164,963	-	3,632,136	3,164,963	-

Source: CoStar Group, Inc., Economics Research Associates, November 2004.

Appendix Table 17
Summary of Demographic Characteristics, 2003-2008
South Liberty Roadway 5-Mile Trade Area

	0-5 Mile		
	2003	2008	% Change
Population	51,989	55,841	7.4%
Households	19,194	21,037	9.6%
Average Household Size	2.62	2.57	-1.9%
Race			
White	47,973	50,859	6.0%
Black	1,656	2,135	28.9%
American Indian, Eskimo	230	238	3.5%
Asian or Pacific Islander	587	855	45.7%
Hispanic Origin/Other	676	865	28.0%
Other	1,843	2,252	22.2%
Median Household Income	\$ 57,329	\$ 66,930	16.7%
Average Household Income	\$ 68,646	\$ 82,064	19.5%
Owner-occupied Units	14,656	16,240	10.8%
Renter-occupied Units	4,528	4,789	5.8%
Median Age	35.1	36.0	2.6%

Source: ESRI Business Information Solutions; Economics Research Associates, November 2004.

Appendix Table 18
Household Age Characteristics, 2003-2008
South Liberty Roadway 5-Mile Trade Area

Age Cohort	0-5 Mile		
	2003	2008	% Change
0 - 4	3,799	4,066	7.0%
5 - 9	3,877	3,841	-0.9%
10 - 14	4,004	4,177	4.3%
15 - 19	3,861	4,146	7.4%
20 - 24	3,546	3,716	4.8%
25 - 29	3,305	3,534	6.9%
30 - 34	4,037	3,935	-2.5%
35 - 39	4,228	4,251	0.5%
40 - 44	4,395	4,439	1.0%
45 - 49	3,947	4,491	13.8%
50 - 54	3,395	3,943	16.1%
55 - 59	2,658	3,244	22.0%
60 - 64	1,978	2,470	24.9%
65 - 69	1,537	1,805	17.4%
70 - 74	1,204	1,317	9.4%
75 - 79	974	1,028	5.5%
80 - 84	664	762	14.8%
85+	579	674	16.4%
TOTAL:	51,988	55,839	7.4%
Median Age	35.1	36.0	2.6%

Source: ESRI Business Information Solutions; Economics Research Associates, November 2004.

Appendix Table 19
Household Income Characteristics, 2003-2008
South Liberty Roadway 5-Mile Trade Area

	0-5 Mile		
	2003	2008	% Change
< \$10,000	731	598	-18.2%
\$10,000-\$14,999	585	482	-17.6%
\$15,000-\$19,999	748	667	-10.8%
\$20,000-\$24,999	850	723	-14.9%
\$25,000-\$29,999	1,065	866	-18.7%
\$30,000-\$34,999	1,074	952	-11.4%
\$35,000-\$39,999	999	1,005	0.6%
\$40,000-\$44,999	1,092	876	-19.8%
Subtotal - Under \$45,000:	7,144	6,169	-13.6%
% of Total	37.2%	29.3%	
\$45,000-\$49,999	1,182	1,182	0.0%
\$50,000-\$59,999	1,998	2,102	5.2%
\$60,000-\$74,999	2,856	2,721	-4.7%
\$75,500-\$99,999	2,824	3,712	31.4%
Subtotal - \$45,000-\$99,999:	8,860	9,717	9.7%
% of Total	46.2%	46.2%	
\$100,000-\$124,999	1,502	2,072	37.9%
\$125,000-\$149,999	773	1,448	87.3%
\$150,000-\$199,999	473	887	87.5%
\$200,000-\$249,999	226	345	52.7%
\$250,000-\$499,999	194	318	63.9%
>\$500,000	25	76	204.0%
Subtotal - \$100,000 & Above:	3,193	5,146	61.2%
% of Total	16.6%	24.5%	
TOTAL HOUSEHOLDS:	19,197	21,032	9.6%

Source: ESRI Business Information Solutions; Economics Research Associates, November 2004.

Appendix Table 20
Annual Household Consumer Expenditures, 2003
South Liberty Roadway 5-Mile Trade Area

2003

Demographic Profile	
Population	51,989
Households	19,194
Median Household Income	\$57,329
Average Household Income	\$68,646

Consumer Retail Expenditures

	Annual Total	Per Household	% Distribution
Food & Beverage			
Food At Home	\$ 91,659,349	\$ 4,775	58.5%
Food Away From Home	55,316,975	\$ 2,882	35.3%
Alcoholic Beverages	9,644,552	\$ 502	6.2%
Subtotal - Food & Beverage:	\$ 156,620,876	\$ 8,160	39.6%
Apparel & Accessories			
Apparel & Services	\$ 57,691,330	\$ 3,006	79.6%
Footwear	9,809,788	511	13.5%
Watches & Jewelry	4,958,402	258	6.8%
Subtotal - Apparel:	\$ 72,459,520	\$ 3,775	18.3%
Leisure & Entertainment			
Entertainment	\$ 64,682,610	\$ 3,370	72.9%
Pets & Supplies	6,970,918	\$ 363	7.9%
Sporting Goods	5,034,867	\$ 262	5.7%
Toys & Games	5,073,428	\$ 264	5.7%
Video Rental	1,432,325	\$ 75	1.6%
Reading Materials	5,531,940	\$ 288	6.2%
Subtotal - Entertainment:	\$ 88,726,088	\$ 4,623	22.5%
Household Furnishings			
Any Household Furnishings	\$ 48,218,401	\$ 2,512	62.4%
Major Appliances	5,474,046	285	7.1%
Home Electronics	23,564,889	1,228	30.5%
Subtotal - Home Furnishings:	\$ 77,257,336	\$ 4,025	19.6%

TOTAL ANNUAL HH EXPENDITURES:	\$ 395,063,820	\$ 20,583	100.0%
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Comparison to U.S.:	\$ 24,241
<i>Difference between U.S. and Trade Area</i>	-15.1%



Economics Research Associates

Memorandum

Date: September 16, 2005
To: Kevin Wallace, HNTB
From: Economics Research Associates
RE: South Liberty Roadway Study - #15650
Value Capture Analysis **Update**

INTRODUCTION

This report is an update of ERA's earlier work from 2003 analyzing the potential revenue generation and resulting supportable infrastructure investment. Specifically, ERA has revised the development program to reflect the use mix and density developed by the City of Liberty and HNTB in July 2005. This revised development program includes a significant increase in the commercial and industrial square footage, as well as a sizable residential component. While the annual absorption of commercial and industrial space has been modeled at a higher volume than the previous analysis, the larger development program results in a longer term to reach buildout.

The absorption of commercial and residential development in the corridor reflects ERA's analysis of area market conditions. This is documented in our summary market analysis report, updated September 19, 2005.

The expanded development program developed by HNTB results in a significant increase in potential tax revenue, resulting in \$39 million in supportable public investment over a 20-year timeframe and \$88 million over a 40-year period. These projected tax revenues are not net of the costs (mostly for public education) associated with residential development. Additionally, all of the City's 2.5 percent sales tax is included in the value capture.

Economics Research Associates (ERA) was retained by HNTB and the City of Liberty to assist in planning for new development around the South Liberty Roadway, a four-mile corridor that will connect Interstate Highway 35 with State Highway 291. The study consists of two stages: a situation and market analysis (Stage I) and a financial and economic analysis of future growth scenarios (Stage II).

This memorandum summarizes Stage II, presenting the findings of an analysis of development economics and supportable land values; magnitude of future value growth; and supportable bonded debt. We have utilized the findings of the market analysis conducted in Stage I and our previous estimates for supportable development in the corridor to both the year-20 and year-40 forecast horizons. The revised buildout scenario includes:

- 1,843,000 square feet of retail
- 905,000 square feet of office
- 2,514,000 square feet of industrial
- 6,751 single family residential units
- 880 multi-family residential units

SUMMARY

We have previously presented the findings of a market analysis and believe that the proposed roadway will help to spur development in a relatively undeveloped part of the region. It has the potential to fundamentally change the market perception of Liberty and to significantly increase the proportion of metropolitan growth captured in the I-35 corridor and in Clay County.

Based on the results of the market analysis and a pro forma residual land value analysis, we have modeled the potential net new fiscal revenues and supportable public investment directly attributable to forecast land use change as a result of the highway improvements in the corridor. Based on existing tax rates the land use change and associated development in the corridor at the rate of absorption that we have forecast will result in total 40-year fiscal revenues to the City of Liberty of approximately \$291 million; \$75 million over the first 20 years.



City of Liberty, MO
South Liberty Roadway Study

Supportable Public Investment Analysis

Summary of Tax Revenues and Supportable Public Investment

Source/Use	20-Year Tax Revenues	40-Year Tax Revenues
Property Tax		
Less Existing	(\$344,661)	(\$1,204,000)
Retail	\$7,426,071	\$37,858,000
Office	\$2,077,652	\$8,155,000
Industrial	\$3,154,168	\$12,289,000
Non-Residential Subtotal	\$12,313,231	\$57,098,000
Single Family Residential	\$28,198,493	\$96,932,000
Multi-Family Residential	\$2,322,245	\$6,302,000
Sales Tax	\$32,648,000	\$130,592,000
Total	\$75,480,000	\$290,920,000
Supportable Public Investment @ 5%	\$39,200,000	\$88,000,000

Source: Economics Research Associates, 2005.

Utilizing a discount rate of five percent, we estimate the net present value or, the supportable public investment in the corridor at approximately \$88 million.

METHODOLOGY

In order to estimate the supportable public investment in the South Liberty Roadway corridor, ERA conducted a discounted 40-year fiscal revenue analysis. The analysis was comprised of the following components:

- The development of model assumptions and inputs including: the development program, existing land values, development costs and future market values, floor area ratios and land requirements and, City of Liberty assessment and tax rates;

- Determination of net cumulative change in real estate market value and assessed taxable value;
- Quantification of net change in real estate tax revenues to the City of Liberty;
- Estimates of retail sales and retail sales tax revenues to the City of Liberty;
- Determination of supportable public investment attributable to land use change in the corridor.

This type of analysis quantifies the net new fiscal revenues attributable to forecast land use change in the corridor and discounts the revenue stream back to arrive at a net present value. The net present value represents the supportable public investment directly attributable to land use change. The discount rate represents the costs associated with issuing and retiring publicly bonded debt.

We would stress that the analysis is limited to quantifying the direct impacts associated with the land use change in the corridor that passes the “but for” test: but for the transportation improvements associated with South Liberty Roadway the land use change would not otherwise have occurred. Excluded from the analysis is a quantification of other potential economic and fiscal benefits that might occur on a regional level such as: travel time and associated cost savings; the potential impact of land use change in the corridor on the market perception and regional competitiveness of the City in general; and, direct and indirect economic impacts associated with new workers in the corridor and region. Such an analysis could form part of a comprehensive analysis of the economic and environmental impacts when plans for the Roadway are further advanced.

The Appendix contains the model tables and the following summarizes the results of the analysis.

MODEL ASSUMPTIONS/INPUTS

We have developed a set of assumptions and model inputs that are presented in Appendix Tables 1 and 2. These assumptions are based primarily on the findings of the market analysis conducted in Stage I of the assignment and also on other intelligence acquired throughout the course of the assignment. The development costs have been estimated utilizing typical industry standards for the Kansas City region and for the highway-oriented nature of the development envisioned in the corridor. Based on our previous estimates for market supportable development in the corridor over the next forty years, we believe approximately 1,900 acres of land will be required to accommodate the land uses in the program. We have netted-out the displaced land and associated taxable value from the results of analysis to arrive at incremental net new fiscal revenues to the City of Liberty.

RESIDUAL VALUE FINANCIAL ANALYSIS

Appendix Table 3 presents the results of a stabilized year pro forma financial analysis conducted to determine the supportable land values as an input to the fiscal impact analysis that follows. We believe that retail land prices in the corridor fall in the \$6.00- \$7.00 range per square foot, office prices at approximately \$3.00 - \$3.50 and industrial land values at around \$2.00.

LAND AND BUILDING ABSORPTION

The 40-year supportable development program will be absorbed by the market throughout the forecast period. We have developed what we believe to be a reasonable absorption schedule for development and land which reflects both recent and existing market conditions and trends and project completion in year 1 of the analysis. Appendix Table 4 reveals that we have ramped up absorption for office and industrial uses following construction of the highway improvements as the market recovers from the current recession and responds to a demand for space at this location generated by the roadway. The retail absorption schedule is more globular and is based on the assumption that a community sized shopping center of about 90,000 square feet could be absorbed by the market every two years or so. Industrial absorption is modeled as occurring fairly steadily throughout the period of analysis; however, in reality this use will likely develop as a series of significant additions to the market. Residential absorption is modeled at approximately 300 single family units and 50 multi-family units annually, until buildout, which occurs prior to the end of the 40-year timeframe for residential.

CUMULATIVE CHANGE IN MARKET AND ASSESSED VALUE

Appendix Tables 5 and 6 summarize the results of the analysis to determine the net change in market and assessed or, taxable value. Existing market values refer to the displaced agricultural and residentially zoned land as it is absorbed for commercial development. We estimate that this land has a total market value in current dollars of approximately \$20 million and is netted out of the results of the analysis as indicated by the negative values. We estimate the future market value of the improvements and land at approximately \$2.9 billion by year 40, with much of the value generated by the single family residential.

Market value translates to assessed value by applying the assessment ratios applicable to the City of liberty. It is the assessed value of the buildings and improvements to which the property tax rate is applied. The assessed value is significantly lower than the market value because an assessment ratio of 32 percent is applied for the purpose of taxing commercial real estate. This, coupled with the tax rate itself, has important implications for the ultimate magnitude of the potential tax revenues attributable to the land use change and hence supportable public investment in the corridor. We estimate the cumulative net change in assessed value in the corridor at approximately \$666 million by year 40.

NET NEW REAL ESTATE PROPERTY AND RETAIL SALES TAXES AND SUPPORTABLE PUBLIC INVESTMENT

As Appendix Tables 7 and 8 reveal, we estimate that the land use change in the corridor will generate approximately \$160 million in property tax revenues and \$130 million in retail sales taxes to the City of Liberty over the 40-year period of the analysis. As noted above, however, this total fiscal benefit of approximately \$290 million does not represent the supportable public investment in the corridor since the fiscal revenue streams must be discounted back to arrive at net present values. We have utilized a discount rate of five percent for the purposes of this analysis. This resultant total value of approximately \$88 million is essentially equal to the supportable publicly bonded debt in the corridor over the next 40 years.

Appendix

City of Liberty, MO
South Liberty Roadway Study

Supportable Public Investment Analysis

Appendix Table 1:
Assumptions/Inputs

Program

Use	Gross SF/Units	Net/Gross Ratio	Net SF/Units
Retail	1,843,000	0.85	1,566,550
Office	905,000	0.90	814,500
Industrial	2,514,000	1.00	2,514,000
SF Residential	6,751	1.00	6,751
MF Residential	880	1.00	880

Land Requirement

Use	Land Required		
	Floor Area Ratio/Units per Acre	Square Feet	Acres
Retail	0.25	7,372,000	169.2
Office	0.25	3,620,000	83.1
Industrial	0.20	12,570,000	288.6
SF Residential	5.00	58,814,700	1,350.2
MF Residential	15.00	2,555,500	58.7

Market Values

Improvements (@ 90% Development Costs)

Use	Hard and Soft Costs Per Square Foot	Market Value	Average SF per Residential Unit	Market Value Per Square Foot
Retail	\$132	\$218,948,400		\$119
Office	\$138	\$112,401,000		\$124
Industrial	\$72	\$162,907,200		\$65
SF Residential	\$110	\$1,670,872,500	2,500	\$99
MF Residential	\$120	\$95,040,000	1,000	\$108
Total	-	\$2,260,169,100		-

Land Value

Use	Market Value Per Square Foot
Agricultural	\$0.14
Residential (Low Density)	\$0.69
Retail	\$6.50
Office	\$3.25
Industrial	\$2.00
SF Residential	\$1.03
MF Residential	\$1.03

Existing Zoning Mix

Agricultural	65%
Residential (Low Density)	35%

Productivity

Annual Retail Sales Per Sq.Ft.	\$325
Retail Occupancy Rate	95%

City Tax Rates

Real Property Assessment Rates:

Agricultural	12%
Residential	19%
Commercial	32%

Tax Rate Per \$100 Assessed Value	\$ 0.9676
State Multiplier	1.00
City Sales Tax Rate	2.25%
Proportion Retail Sales Taxes Net New	60.0%

City of Liberty, MO
South Liberty Roadway Study
Supportable Public Investment Analysis

Appendix Table 2:
Operating Assumptions

Retail

Average Tripple Net Rent Per Sq. Ft.	\$20.00
Unrecoverable Expenses @	15.0%
Net Income	\$17.00
Average Occupancy	95%

Office

Average Gross Rent Per Sq. Ft.	\$19.00
Expenses @	20%
Net Income	\$15.20
Average Occupancy	95%

Industrial/Flex

Average Gross Rent Per Sq. Ft.	\$7.50
Expenses @	6%
Net Rents	\$7.05
Average Occupancy	100%

Source: Economics Research Associates, 2005.

City of Liberty, MO
South Liberty Roadway Study

Appendix Table 3:
Consolidated Stabilized Year Pro Forma and Residual Land Value

Project Description	Retail	Office	Industrial	Total
Total Hard and Soft Costs	\$273,685,500	\$140,501,250	\$203,634,000	\$617,820,750
Misc. Interest and Fees @ 5%	\$13,684,275	\$7,025,063	\$10,181,700	\$30,891,038
Total Development Costs	\$287,369,775	\$147,526,313	\$213,815,700	\$648,711,788
Land Acquisition Costs (2)				
Per Sq. Ft. - Land	-	-	-	
Per Sq. Ft. - FAR	-	-	-	
Total Land Costs :	-	-	-	
TOTAL DEVELOPMENT COSTS	\$287,369,775	\$147,526,313	\$213,815,700	\$648,711,788
Revenues and Expenses				
Total Net Income:	\$25,299,783	\$11,761,380	\$17,723,700	\$54,784,863
Residual Land Value				
Capitalization Rate	10%	10%	10%	
Indicated Value:	\$252,997,825	\$117,613,800	\$177,237,000	\$547,848,625
Less Development Costs:	\$287,369,775	\$147,526,313	\$213,815,700	\$648,711,788
Total Residual Value:	(\$34,371,950)	(\$29,912,513)	(\$36,578,700)	(\$100,863,163)
Per Square Foot Land	(\$4.66)	(\$8.26)	(\$2.91)	
Per Acre	(\$203,099)	(\$359,942)	(\$126,760)	

Source: Economics Research Associates, 2005.

City of Liberty, MO
South Liberty Roadway Study

Supportable Public Investment Analysis

Appendix Table 4:
Land and Building Absorption

Absorption Schedule

Use	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Retail	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%
Office	2%	2%	2%	2%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Industrial	2%	2%	2%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
SF Residential	2%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
MF Residential	3%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	1%	0%	0%
Use	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40
Retail	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%	0%	5%
Office	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Industrial	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
SF Residential	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
MF Residential	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Square Feet/Units Absorbed

Use	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Retail	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150
Office	18,100	18,100	18,100	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150
Industrial	50,280	50,280	50,280	75,420	75,420	75,420	75,420	75,420	75,420	75,420	75,420	75,420	75,420	75,420	75,420	75,420	75,420	75,420	75,420	75,420
SF Residential (Units)	135	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270	270
MF Residential (Units)	26	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	9	0	0
Use	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40
Retail	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150	0	92,150
Office	27,150	27,150	27,150	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100	18,100
Industrial	75,420	75,420	75,420	50,280	50,280	50,280	50,280	50,280	50,280	50,280	50,280	50,280	50,280	50,280	50,280	50,280	50,280	50,280	50,280	50,280
SF Residential	270	270	270	270	270	135	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Land Absorbed (SF)

Use	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Retail	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600
Office	72,400	72,400	72,400	108,600	108,600	108,600	108,600	108,600	108,600	108,600	108,600	108,600	108,600	108,600	108,600	108,600	108,600	108,600	108,600	108,600
Industrial	251,400	251,400	251,400	377,100	377,100	377,100	377,100	377,100	377,100	377,100	377,100	377,100	377,100	377,100	377,100	377,100	377,100	377,100	377,100	377,100
SF Residential	1,176,294	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588
MF Residential	76,665	153,330	153,330	153,330	153,330	153,330	153,330	153,330	153,330	153,330	153,330	153,330	153,330	153,330	153,330	153,330	153,330	25,555	0	0
Total	1,576,759	3,198,318	2,829,718	3,360,218	2,991,618	3,360,218	2,991,618	3,360,218	2,991,618	3,360,218	2,991,618	3,360,218	2,991,618	3,360,218	2,991,618	3,360,218	2,991,618	3,232,443	2,838,288	3,206,888
Use	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40
Retail	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600	0	368,600
Office	108,600	108,600	108,600	72,400	72,400	72,400	72,400	72,400	72,400	72,400	72,400	72,400	72,400	72,400	72,400	72,400	72,400	72,400	72,400	72,400
Industrial	377,100	377,100	377,100	251,400	251,400	251,400	251,400	251,400	251,400	251,400	251,400	251,400	251,400	251,400	251,400	251,400	251,400	251,400	251,400	251,400
SF Residential	2,352,588	2,352,588	2,352,588	2,352,588	2,352,588	1,176,294	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MF Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2,838,288	3,206,888	2,838,288	3,044,988	2,676,388	1,868,694	323,800	692,400	323,800	692,400	323,800	692,400	323,800	692,400	323,800	692,400	323,800	692,400	323,800	692,400

Source: Economics Research Associates, 2015.

City of Liberty, MO
South Liberty Roadway Study

Supportable Public Investment Analysis

Appendix Table 5:

Cumulative Change in Market Value

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Existing Market Value																				
Agricultural Zoned	(\$141,170)	(\$427,321)	(\$680,070)	(\$881,716)	(\$1,249,561)	(\$1,550,407)	(\$1,818,251)	(\$2,386,942)	(\$2,687,788)	(\$2,956,632)	(\$3,296,478)	(\$3,524,323)	(\$3,625,169)	(\$4,083,013)	(\$4,393,859)	(\$4,661,704)	(\$4,961,110)	(\$5,205,227)	(\$5,492,445)	(\$5,892,348)
Residential Zoned	(\$398,073)	(\$1,951,077)	(\$1,833,112)	(\$2,643,062)	(\$3,364,262)	(\$4,174,172)	(\$4,896,292)	(\$5,705,262)	(\$6,426,362)	(\$7,236,351)	(\$8,046,341)	(\$8,767,441)	(\$9,488,541)	(\$10,209,551)	(\$11,019,651)	(\$11,829,751)	(\$12,639,851)	(\$13,449,951)	(\$14,259,051)	(\$15,069,151)
Sub-Total	(\$539,243)	(\$2,378,400)	(\$2,513,182)	(\$3,524,778)	(\$4,613,823)	(\$5,724,579)	(\$6,714,543)	(\$7,823,359)	(\$8,853,304)	(\$9,973,139)	(\$11,072,992)	(\$12,063,919)	(\$13,017,082)	(\$13,834,702)	(\$14,912,664)	(\$15,943,610)	(\$16,975,555)	(\$18,007,500)	(\$19,039,445)	(\$20,071,390)
Improved Market Value																				
Office	\$236,300	\$470,000	\$705,900	\$1,058,800	\$1,411,800	\$1,764,700	\$2,117,600	\$2,470,500	\$2,823,400	\$3,176,300	\$3,529,200	\$3,882,100	\$4,235,000	\$4,587,900	\$4,940,800	\$5,293,700	\$5,646,600	\$6,000,000	\$6,353,400	\$6,706,800
Buildings	\$2,248,020	\$4,486,040	\$7,868,070	\$11,248,100	\$14,612,130	\$17,984,160	\$21,356,190	\$24,728,220	\$28,100,250	\$31,472,280	\$34,844,310	\$38,216,340	\$41,588,370	\$44,960,400	\$48,332,430	\$51,704,460	\$55,076,490	\$58,448,520	\$61,820,550	\$65,192,580
Sub-Total	\$2,484,320	\$4,956,040	\$8,573,970	\$12,316,900	\$16,023,930	\$19,748,860	\$23,476,890	\$27,204,920	\$30,932,950	\$34,660,980	\$38,389,010	\$42,117,040	\$45,845,070	\$49,573,100	\$53,301,130	\$57,029,160	\$60,757,190	\$64,485,220	\$68,213,250	\$71,941,280
Industrial																				
Land	\$502,800	\$1,005,600	\$1,508,400	\$2,011,200	\$2,514,000	\$3,016,800	\$3,519,600	\$4,022,400	\$4,525,200	\$5,028,000	\$5,530,800	\$6,033,600	\$6,536,400	\$7,039,200	\$7,542,000	\$8,044,800	\$8,547,600	\$9,050,400	\$9,553,200	\$10,056,000
Buildings	\$3,258,144	\$6,516,288	\$9,774,432	\$13,032,576	\$16,290,720	\$19,548,864	\$22,807,008	\$26,065,152	\$29,323,296	\$32,581,440	\$35,839,584	\$39,097,728	\$42,355,872	\$45,614,016	\$48,872,160	\$52,130,304	\$55,388,448	\$58,646,592	\$61,904,736	\$65,162,880
Sub-Total	\$3,760,944	\$7,527,168	\$11,282,832	\$15,044,784	\$18,806,720	\$22,568,656	\$26,330,592	\$30,092,528	\$33,854,464	\$37,616,400	\$41,378,336	\$45,140,272	\$48,902,208	\$52,664,144	\$56,426,080	\$60,188,016	\$63,949,952	\$67,711,888	\$71,473,824	\$75,235,760
SF Residential																				
Land	\$1,215,180	\$3,645,539	\$6,075,899	\$8,506,258	\$10,936,618	\$13,366,977	\$15,797,337	\$18,227,696	\$20,658,056	\$23,088,415	\$25,518,775	\$27,949,134	\$30,379,494	\$32,809,853	\$35,240,213	\$37,670,572	\$40,100,932	\$42,531,291	\$44,961,651	\$47,392,010
Buildings	\$37,130,500	\$111,391,500	\$185,652,000	\$259,913,500	\$334,174,500	\$408,435,500	\$482,696,500	\$556,957,500	\$631,218,500	\$705,479,500	\$779,740,500	\$854,001,500	\$928,262,500	\$1,002,523,500	\$1,076,784,500	\$1,151,045,500	\$1,225,306,500	\$1,299,567,500	\$1,373,828,500	\$1,448,089,500
Sub-Total	\$38,345,680	\$115,037,039	\$191,727,899	\$268,419,758	\$344,111,118	\$420,832,477	\$498,493,837	\$576,155,196	\$651,776,556	\$727,497,915	\$803,219,275	\$879,740,634	\$955,264,994	\$1,031,333,353	\$1,107,404,713	\$1,183,476,072	\$1,259,547,432	\$1,335,618,791	\$1,411,700,151	\$1,487,781,510
MF Residential																				
Land	\$79,109	\$237,598	\$395,097	\$554,396	\$713,794	\$873,193	\$1,032,592	\$1,191,991	\$1,351,390	\$1,510,789	\$1,670,188	\$1,829,587	\$1,988,986	\$2,148,385	\$2,307,784	\$2,467,183	\$2,626,582	\$2,785,981	\$2,945,380	\$3,104,779
Buildings	\$3,189,000	\$9,567,000	\$15,945,000	\$22,323,000	\$28,701,000	\$35,079,000	\$41,457,000	\$47,835,000	\$54,213,000	\$60,591,000	\$66,969,000	\$73,347,000	\$79,725,000	\$86,103,000	\$92,481,000	\$98,859,000	\$105,237,000	\$111,615,000	\$117,993,000	\$124,371,000
Sub-Total	\$3,268,109	\$9,804,598	\$16,340,097	\$22,876,000	\$29,418,000	\$35,956,000	\$42,494,000	\$48,932,000	\$55,470,000	\$61,908,000	\$68,346,000	\$74,784,000	\$81,222,000	\$87,660,000	\$94,098,000	\$100,536,000	\$106,974,000	\$113,412,000	\$119,850,000	\$126,288,000
Net Change	\$12,138,221	\$149,091,948	\$235,278,506	\$340,083,164	\$536,411,012	\$627,974,202	\$728,233,660	\$828,493,118	\$928,752,576	\$1,029,012,034	\$1,129,271,492	\$1,229,530,950	\$1,329,790,408	\$1,429,049,866	\$1,529,309,324	\$1,629,568,782	\$1,729,828,240	\$1,829,087,698	\$1,929,347,156	\$2,029,606,614
Improved Market Value																				
Agricultural Zoned	(\$5,746,461)	(\$6,033,580)	(\$6,287,690)	(\$6,560,319)	(\$6,799,941)	(\$6,967,248)	(\$7,068,238)	(\$7,098,230)	(\$7,087,220)	(\$7,149,212)	(\$7,178,202)	(\$7,240,194)	(\$7,269,185)	(\$7,331,176)	(\$7,360,167)	(\$7,422,158)	(\$7,451,149)	(\$7,513,140)	(\$7,542,131)	(\$7,604,123)
Residential Zoned	(\$15,471,242)	(\$16,244,252)	(\$16,928,413)	(\$17,662,369)	(\$18,307,552)	(\$18,952,735)	(\$19,638,026)	(\$20,323,317)	(\$21,008,608)	(\$21,693,899)	(\$22,379,190)	(\$23,064,481)	(\$23,749,772)	(\$24,435,063)	(\$25,120,354)	(\$25,805,645)	(\$26,490,936)	(\$27,176,227)	(\$27,861,518)	(\$28,546,809)
Sub-Total	(\$21,217,703)	(\$22,277,832)	(\$23,216,103)	(\$24,222,717)	(\$25,107,493)	(\$25,920,000)	(\$26,706,264)	(\$27,421,547)	(\$28,115,828)	(\$28,843,103)	(\$29,577,381)	(\$30,311,671)	(\$31,045,960)	(\$31,780,249)	(\$32,514,538)	(\$33,248,827)	(\$33,983,116)	(\$34,717,405)	(\$35,451,694)	(\$36,186,000)
Improved Market Value																				
Office	\$224,039,215	\$254,863,387	\$273,332,659	\$293,125,281	\$310,821,803	\$322,668,314	\$334,773,014	\$359,273,614	\$331,378,314	\$335,875,914	\$337,983,614	\$342,484,214	\$344,589,814	\$346,695,414	\$351,194,214	\$355,693,014	\$357,798,614	\$362,300,114	\$364,404,814	\$368,905,414
Buildings	\$109,474,200	\$120,421,620	\$127,061,620	\$131,369,040	\$131,369,040	\$142,316,460	\$142,316,460	\$153,263,880	\$153,263,880	\$164,211,300	\$164,211,300	\$175,158,720	\$175,158,720	\$186,106,140	\$186,106,140	\$197,053,560	\$197,053,560	\$208,000,980	\$208,000,980	\$218,948,400
Sub-Total	\$343,513,415	\$375,285,007	\$393,394,279	\$424,494,321	\$442,190,843	\$464,984,774	\$477,086,474	\$492,537,494	\$484,642,194	\$500,087,214	\$500,087,214	\$517,642,934	\$517,642,934	\$533,198,654	\$533,198,654	\$552,747,374	\$552,747,374	\$570,301,094	\$570,301,094	\$589,853,814
Office																				
Land	\$7,099,000	\$7,411,950	\$7,764,900	\$8,000,000	\$8,235,500	\$8,470,800	\$8,706,100	\$8,941,400	\$9,176,700	\$9,412,000	\$9,647,300	\$9,882,600	\$10,117,900	\$10,353,200	\$10,588,500	\$10,823,800	\$11,059,100	\$11,284,400	\$11,509,700	\$11,735,000
Buildings	\$1,829,350	\$3,658,700	\$5,488,050	\$7,317,400	\$9,146,750	\$10,976,100	\$12,805,450	\$14,634,800	\$16,464,150	\$18,293,500	\$20,122,850	\$21,952,200	\$23,781,550	\$25,610,900	\$27,440,250	\$29,269,600	\$31,098,950	\$32,928,300	\$34,757,650	\$36,587,000
Sub-Total	\$8,928,350	\$11,070,650	\$13,252,950	\$15,317,400	\$17,382,250	\$19,446,900	\$21,511,550	\$23,576,200	\$25,580,850	\$27,624,500	\$29,667,150	\$31,709,800	\$33,751,450	\$35,793,100	\$37,834,750	\$39,876,400	\$41,918,050	\$43,959,700	\$45,991,350	\$48,023,000
Industrial																				
Land	\$10,558,800	\$11,313,000	\$12,067,200	\$12,770,000	\$13,072,800	\$13,575,600	\$14,078,400	\$14,581,200	\$15,084,000	\$15,586,800	\$16,089,600	\$16,592,400	\$17,095,200	\$17,598,000	\$18,100,800	\$18,603,600	\$19,106,400	\$19,609,200	\$20,112,000	\$20,614,800
Buildings	\$97,744,320	\$102,631,536	\$107,518,712	\$110,776,880	\$114,035,040	\$117,293,184	\$120,551,328	\$123,809,472	\$127,067,616	\$130,325,760	\$133,583,904	\$136,842,048	\$140,100,192	\$143,358,336	\$146,616,480	\$149,874,624	\$153,132,768	\$156,390,912	\$159,649,056	\$162,907,200
Sub-Total	\$108,303,120	\$113,944,536	\$119,585,912	\$123,468,880	\$127,107,840	\$130,868,784	\$134,629,728	\$138,390,672	\$142,151,616	\$145,912,560	\$149,673,504	\$153,434,448	\$157,195,392	\$160,956,336	\$164,717,280	\$168,478,224	\$172,239,168	\$176,000,112	\$179,761,056	\$183,522,000
SF Residential																				
Land	\$49,822,370	\$52,292,720	\$54,693,989	\$57,113,448	\$59,543,808	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988	\$60,758,988
Buildings	\$1,829,350,920	\$1,896,611,500	\$1,970,872,800	\$1,745,133,500	\$1,819,394,500	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000	\$1,895,525,000
Sub-Total	\$1,879,173,290	\$1,948,904,220	\$2,025,566,789	\$1,890,267,000	\$1,975,789,000	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988	\$1,956,283,988
MF Residential																				
Land	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979	\$2,639,979
Buildings	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000	\$105,600,000
Sub-Total	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979	\$108,239,979
Net Change	\$1,163,240,200	\$2,340,633,979	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400	\$2,430,647,400
Source: Economics Research Associates, 2005.																				

Supportable Public Investment Analysis

Cumulative Change in Assessed Value

Baseline Assessed Value		Improved Market Value																		
Category	Value	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Agricultural Zoned	\$16,940	\$51,302	\$81,704	\$117,806	\$149,947	\$186,048	\$224,190	\$264,433	\$322,535	\$383,440	\$446,259	\$511,920	\$580,777	\$652,881	\$728,132	\$806,543	\$888,112	\$972,743	\$1,061,436	\$1,154,195
Residential Zoned	\$72,214	\$232,981	\$358,297	\$493,938	\$648,009	\$811,526	\$994,568	\$1,197,125	\$1,419,197	\$1,660,284	\$1,936,897	\$2,248,039	\$2,594,716	\$2,985,939	\$3,421,704	\$3,902,019	\$4,426,984	\$4,997,699	\$5,614,164	\$6,275,489
Sub-Total	\$89,154	\$269,963	\$423,966	\$619,931	\$797,956	\$997,574	\$1,248,758	\$1,591,258	\$1,967,792	\$2,357,523	\$2,833,156	\$3,360,739	\$3,943,495	\$4,571,878	\$5,249,836	\$5,984,038	\$6,775,967	\$7,610,442	\$8,505,650	\$9,459,684
Land	\$0	\$766,688	\$766,688	\$1,533,376	\$1,533,376	\$2,300,064	\$2,300,064	\$3,066,752	\$3,066,752	\$3,833,440	\$10,056,005	\$17,045,259	\$23,267,824	\$28,925,078	\$36,476,643	\$43,466,887	\$49,691,482	\$56,414,944	\$62,316,583	\$68,988,910
Buildings	\$0	\$3,503,174	\$3,503,174	\$7,006,348	\$7,006,348	\$14,012,696	\$14,012,696	\$28,025,392	\$28,025,392	\$56,050,784	\$112,101,568	\$224,203,136	\$336,304,704	\$504,457,056	\$756,685,584	\$1,135,028,384	\$1,702,542,144	\$2,553,813,216	\$3,730,719,808	\$5,446,079,712
Sub-Total	\$0	\$3,503,174	\$3,503,174	\$7,006,348	\$7,006,348	\$14,012,696	\$14,012,696	\$28,025,392	\$28,025,392	\$56,050,784	\$112,101,568	\$224,203,136	\$336,304,704	\$504,457,056	\$756,685,584	\$1,135,028,384	\$1,702,542,144	\$2,553,813,216	\$3,730,719,808	\$5,446,079,712
Office	\$75,036	\$150,072	\$225,108	\$337,662	\$506,493	\$759,739	\$1,139,609	\$1,709,414	\$2,563,621	\$3,845,431	\$5,768,147	\$8,652,220	\$12,978,330	\$19,467,495	\$29,201,242	\$43,801,863	\$65,702,794	\$98,554,191	\$147,831,286	\$221,746,929
Land	\$0	\$150,072	\$150,072	\$300,144	\$300,144	\$450,216	\$450,216	\$675,324	\$675,324	\$1,012,936	\$1,519,304	\$2,278,956	\$3,418,434	\$5,127,651	\$7,691,477	\$11,537,215	\$17,305,822	\$25,958,733	\$38,938,099	\$58,407,149
Buildings	\$75,036	\$150,072	\$225,108	\$337,662	\$506,493	\$759,739	\$1,139,609	\$1,709,414	\$2,563,621	\$3,845,431	\$5,768,147	\$8,652,220	\$12,978,330	\$19,467,495	\$29,201,242	\$43,801,863	\$65,702,794	\$98,554,191	\$147,831,286	\$221,746,929
Sub-Total	\$75,036	\$150,072	\$225,108	\$337,662	\$506,493	\$759,739	\$1,139,609	\$1,709,414	\$2,563,621	\$3,845,431	\$5,768,147	\$8,652,220	\$12,978,330	\$19,467,495	\$29,201,242	\$43,801,863	\$65,702,794	\$98,554,191	\$147,831,286	\$221,746,929
Industrial	\$794,862	\$1,589,723	\$1,664,121	\$2,856,614	\$4,448,608	\$6,432,595	\$9,648,898	\$14,473,347	\$21,710,020	\$32,565,030	\$49,847,545	\$74,771,318	\$112,156,977	\$168,235,466	\$252,353,199	\$378,529,798	\$567,794,697	\$851,692,046	\$1,277,538,149	\$1,916,306,848
Land	\$0	\$231,792	\$231,792	\$463,584	\$463,584	\$695,376	\$695,376	\$1,043,064	\$1,043,064	\$1,564,596	\$2,346,894	\$3,520,336	\$5,280,504	\$7,920,756	\$11,881,134	\$17,821,701	\$26,732,552	\$40,098,828	\$60,148,242	\$89,722,363
Buildings	\$794,862	\$1,357,931	\$1,432,329	\$2,393,030	\$3,985,024	\$5,737,219	\$8,753,522	\$13,370,283	\$20,676,956	\$30,980,434	\$46,281,152	\$68,635,982	\$102,876,414	\$154,314,712	\$229,472,045	\$346,708,087	\$524,666,145	\$781,543,818	\$1,166,815,787	\$1,826,584,485
Sub-Total	\$794,862	\$1,589,723	\$1,664,121	\$2,856,614	\$4,448,608	\$6,432,595	\$9,648,898	\$14,473,347	\$21,710,020	\$32,565,030	\$49,847,545	\$74,771,318	\$112,156,977	\$168,235,466	\$252,353,199	\$378,529,798	\$567,794,697	\$851,692,046	\$1,277,538,149	\$1,916,306,848
SF Residential	\$20,804	\$692,852	\$1,154,211	\$1,616,189	\$2,077,072	\$2,541,935	\$3,001,404	\$3,463,262	\$3,925,031	\$4,386,799	\$4,848,567	\$5,309,336	\$5,772,104	\$6,233,872	\$6,695,640	\$7,157,409	\$7,619,177	\$8,080,945	\$8,542,714	\$9,004,484
Buildings	\$7,854,795	\$21,184,365	\$35,273,973	\$49,383,565	\$63,493,155	\$77,602,745	\$91,712,335	\$105,821,925	\$119,931,675	\$134,041,105	\$148,150,695	\$162,260,285	\$176,369,875	\$190,479,465	\$204,589,055	\$224,691,625	\$244,794,195	\$264,896,765	\$284,998,335	\$305,099,905
Sub-Total	\$7,865,599	\$21,887,217	\$36,428,186	\$50,599,754	\$66,035,112	\$80,144,712	\$94,713,739	\$109,285,187	\$123,856,546	\$138,427,914	\$152,990,262	\$167,561,621	\$182,141,979	\$196,713,337	\$211,284,695	\$225,856,034	\$240,427,412	\$254,998,770	\$269,570,819	\$284,141,487
MF Residential	\$15,048	\$45,144	\$75,239	\$105,335	\$135,431	\$165,527	\$195,622	\$225,718	\$255,814	\$285,910	\$316,006	\$346,101	\$376,197	\$406,293	\$436,389	\$466,484	\$496,580	\$526,676	\$556,772	\$586,868
Land	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Buildings	\$15,048	\$45,144	\$75,239	\$105,335	\$135,431	\$165,527	\$195,622	\$225,718	\$255,814	\$285,910	\$316,006	\$346,101	\$376,197	\$406,293	\$436,389	\$466,484	\$496,580	\$526,676	\$556,772	\$586,868
Sub-Total	\$15,048	\$45,144	\$75,239	\$105,335	\$135,431	\$165,527	\$195,622	\$225,718	\$255,814	\$285,910	\$316,006	\$346,101	\$376,197	\$406,293	\$436,389	\$466,484	\$496,580	\$526,676	\$556,772	\$586,868
Net Change	\$9,911,607	\$17,004,137	\$46,028,220	\$71,610,636	\$90,144,023	\$109,285,187	\$131,026,430	\$153,094,160	\$171,127,547	\$194,600,934	\$219,450,957	\$246,570,679	\$273,424,631	\$302,351,104	\$327,387,736	\$354,497,429	\$381,543,681	\$409,610,627	\$432,671,957	\$460,035,367
Baseline Assessed Value	(6888,578)	(7224,030)	(7544,524)	(7872,238)	(8236,070)	(8594,548)	(8946,988)	(9284,428)	(9619,868)	(9959,308)	(10290,748)	(10619,188)	(10945,628)	(11269,068)	(11589,508)	(11906,948)	(12221,388)	(12533,828)	(12844,268)	(13151,708)
Agricultural Zoned	(8,939,336)	(13,686,483)	(18,433,630)	(23,180,777)	(27,927,924)	(32,675,071)	(37,422,218)	(42,169,365)	(46,916,512)	(51,663,659)	(56,410,806)	(61,157,953)	(65,905,100)	(70,652,247)	(75,399,394)	(80,146,541)	(84,893,688)	(89,640,835)	(94,387,982)	(99,135,129)
Sub-Total	(3,926,111)	(3,910,458)	(3,916,932)	(3,913,406)	(3,909,880)	(3,906,354)	(3,902,828)	(3,899,302)	(3,895,776)	(3,892,250)	(3,888,724)	(3,885,198)	(3,881,672)	(3,878,146)	(3,874,620)	(3,871,094)	(3,867,568)	(3,864,042)	(3,860,516)	(3,856,990)
Improved Market Value	\$7,824,549	\$17,818,571	\$28,812,702	\$39,806,832	\$50,800,962	\$61,795,092	\$72,789,222	\$83,783,352	\$94,777,482	\$105,771,612	\$116,765,742	\$127,759,872	\$138,753,992	\$149,748,122	\$160,742,252	\$171,736,382	\$182,730,512	\$193,724,642	\$204,718,772	\$215,712,902
Office	\$259,800	\$271,824	\$284,768	\$299,040	\$314,312	\$329,584	\$344,856	\$360,128	\$375,400	\$390,672	\$405,944	\$421,216	\$436,488	\$451,760	\$467,032	\$482,304	\$497,576	\$512,848	\$528,120	\$543,392
Land	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Buildings	\$259,800	\$271,824	\$284,768	\$299,040	\$314,312	\$329,584	\$344,856	\$360,128	\$375,400	\$390,672	\$405,944	\$421,216	\$436,488	\$451,760	\$467,032	\$482,304	\$497,576	\$512,848	\$528,120	\$543,392
Sub-Total	\$259,800	\$271,824	\$284,768	\$299,040	\$314,312	\$329,584	\$344,856	\$360,128	\$375,400	\$390,672	\$405,944	\$421,216	\$436,488	\$451,760	\$467,032	\$482,304	\$497,576	\$512,848	\$528,120	\$543,392
Industrial	\$2,310,926	\$2,424,469	\$2,538,012	\$2,651,555	\$2,765,098	\$2,879,641	\$2,994,184	\$3,108,727	\$3,223,270	\$3,337,813	\$3,452,356	\$3,566,899	\$3,681,442	\$3,795,985	\$3,910,528	\$4,025,071	\$4,139,614	\$4,254,157	\$4,368,700	\$4,483,243
Land	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Buildings	\$2,310,926	\$2,424,469	\$2,538,012	\$2,651,555	\$2,765,098	\$2,879,641	\$2,994,184	\$3,108,727	\$3,223,270	\$3,337,813	\$3,452,356	\$3,566,899	\$3,681,442	\$3,795,985	\$3,910,528	\$4,025,071	\$4,139,614	\$4,254,157	\$4,368,700	\$4,483,243
Sub-Total	\$2,310,926	\$2,424,469	\$2,538,012	\$2,651,555	\$2,765,098	\$2,879,641	\$2,994,184	\$3,108,727	\$3,223,270	\$3,337,813	\$3,452,356	\$3,566,899	\$3,681,442	\$3,795,985	\$3,910,528	\$4,025,071	\$4,139,614	\$4,254,157	\$4,368,700	\$4,483,243
SF Residential	\$3,378,816	\$3,620,160	\$3,861,504	\$4,102,848	\$4,344,192	\$4,585,536	\$4,826,880	\$5,068,224	\$5,309,568	\$5,550,912	\$5,792,256	\$6,033,600	\$6,274,944	\$6,516,288	\$6,757,632	\$6,998,976	\$7,240,320	\$7,481,664	\$7,723,008	\$7,964,352
Land	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Buildings	\$3,378,816	\$3,620,160	\$3,861,504	\$4,102,848	\$4,344,192	\$4,585,536	\$4,826,880	\$5,068,224	\$5,309,568	\$5,550,912	\$5,792,256	\$6,033,600	\$6,274,944	\$6,516,288	\$6,757,632	\$6,998,976	\$7,240,320	\$7,481,664	\$7,723,008	\$7,964,352
Sub-Total	\$3,378,816	\$3,620,160	\$3,861,504	\$4,102,848	\$4,344,192	\$4,585,536	\$4,826,880	\$5,068,224	\$5,309,568	\$5,550,912	\$5,792,256	\$6,033,600	\$6,274,944	\$6,516,288	\$6,757,632	\$6,998,976	\$7,240,320	\$7,481,664	\$7,723,008	\$7,964,352
MF Residential	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084
Land	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Buildings	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084
Sub-Total	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084	\$20,084
Net Change	\$483,351,127	\$150,911,907	\$354,223,667	\$560,457,767	\$762,442,847	\$959,011,087	\$1,160,664,447	\$1,368,566,828	\$1,571,220,188	\$1,772,225,568	\$1,972,230,948	\$2,172,235,328	\$2,372,239,708	\$2,572,244,088	\$2,772,248,468	\$2,972,252,848	\$3,172,257,228	\$3,372,261,608	\$3,572,265,988	\$3,772,270,368

Source: Economics Research Associates, 2005.

City of Liberty, MO
South Liberty Roadway Study

Supportable Public Investment Analysis

Appendix Table 7:
Net New Property Taxes and Supportable Public Investment

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Baseline Property Taxes																				
Agricultural Zoned	(\$164)	(\$469)	(\$791)	(\$1,140)	(\$1,451)	(\$1,800)	(\$2,111)	(\$2,451)	(\$2,729)	(\$3,121)	(\$3,432)	(\$3,781)	(\$4,092)	(\$4,441)	(\$4,752)	(\$5,102)	(\$5,413)	(\$5,749)	(\$6,044)	(\$6,377)
Residential Zoned	(\$24,116)	(\$2,316)	(\$3,230)	(\$4,145)	(\$5,060)	(\$5,975)	(\$6,890)	(\$7,805)	(\$8,720)	(\$9,635)	(\$10,550)	(\$11,465)	(\$12,380)	(\$13,295)	(\$14,210)	(\$15,125)	(\$16,040)	(\$16,955)	(\$17,870)	(\$18,785)
Sub-Total	(\$24,980)	(\$2,845)	(\$4,021)	(\$5,285)	(\$6,511)	(\$7,775)	(\$9,001)	(\$10,256)	(\$11,449)	(\$12,752)	(\$14,122)	(\$15,496)	(\$16,900)	(\$18,336)	(\$19,802)	(\$20,757)	(\$21,813)	(\$22,864)	(\$23,915)	(\$24,942)
Improved Property Taxes																				
Retail																				
Land	\$0	\$7,418	\$7,418	\$14,837	\$14,837	\$22,255	\$22,255	\$29,674	\$29,674	\$37,092	\$97,302	\$164,630	\$225,138	\$292,767	\$352,977	\$420,605	\$480,815	\$545,871	\$602,965	\$667,637
Buildings	\$0	\$33,897	\$33,897	\$67,793	\$67,793	\$101,690	\$101,690	\$135,587	\$135,587	\$169,484	\$169,484	\$239,380	\$237,277	\$271,174	\$271,174	\$305,070	\$305,070	\$338,967	\$338,967	\$338,967
Sub-Total	\$0	\$41,315	\$41,315	\$82,630	\$82,630	\$123,946	\$123,946	\$165,261	\$165,261	\$206,576	\$266,785	\$398,310	\$426,520	\$500,044	\$590,254	\$663,179	\$771,988	\$850,941	\$908,065	\$1,006,604
Office																				
Land	\$729	\$1,457	\$1,457	\$2,913	\$2,913	\$4,369	\$4,369	\$6,553	\$6,553	\$9,830	\$10,298	\$15,438	\$13,114	\$14,207	\$15,300	\$16,393	\$17,486	\$18,579	\$19,671	\$20,764
Buildings	\$6,981	\$13,921	\$13,921	\$27,842	\$27,842	\$41,763	\$41,763	\$62,645	\$62,645	\$93,968	\$97,448	\$147,889	\$118,320	\$128,771	\$139,212	\$149,653	\$160,094	\$170,534	\$180,975	\$191,416
Sub-Total	\$7,689	\$15,378	\$15,378	\$27,841	\$27,841	\$46,132	\$46,132	\$69,198	\$69,198	\$103,798	\$107,746	\$163,327	\$131,444	\$142,978	\$154,512	\$166,045	\$177,579	\$189,113	\$200,647	\$212,180
Industrial																				
Land	\$1,557	\$3,114	\$3,114	\$6,228	\$6,228	\$9,342	\$9,342	\$13,963	\$13,963	\$20,945	\$21,413	\$32,120	\$26,576	\$28,751	\$30,926	\$33,101	\$35,276	\$37,451	\$39,626	\$41,801
Buildings	\$10,088	\$20,177	\$20,177	\$40,354	\$40,354	\$60,531	\$60,531	\$90,797	\$90,797	\$136,196	\$141,511	\$212,267	\$176,658	\$191,689	\$206,720	\$221,751	\$236,782	\$251,813	\$266,844	\$281,875
Sub-Total	\$11,645	\$23,291	\$23,291	\$46,582	\$46,582	\$69,869	\$69,869	\$104,760	\$104,760	\$157,153	\$162,924	\$244,387	\$203,234	\$213,440	\$228,247	\$247,856	\$264,359	\$279,264	\$296,690	\$313,756
SP Residential																				
Land	\$2,224	\$4,448	\$4,448	\$8,896	\$8,896	\$13,344	\$13,344	\$20,016	\$20,016	\$29,964	\$30,720	\$46,080	\$38,400	\$41,280	\$44,160	\$47,040	\$49,920	\$52,800	\$55,680	\$58,560
Buildings	\$88,262	\$176,524	\$176,524	\$353,048	\$353,048	\$529,572	\$529,572	\$794,358	\$794,358	\$1,191,537	\$1,236,816	\$1,855,224	\$1,512,000	\$1,603,200	\$1,694,400	\$1,785,600	\$1,876,800	\$1,968,000	\$2,059,200	\$2,150,400
Sub-Total	\$90,486	\$181,000	\$181,000	\$361,944	\$361,944	\$542,916	\$542,916	\$814,374	\$814,374	\$1,211,501	\$1,267,536	\$1,901,304	\$1,550,400	\$1,644,480	\$1,738,560	\$1,832,640	\$1,926,720	\$2,020,800	\$2,114,880	\$2,208,960
MP Residential																				
Land	\$146	\$292	\$292	\$584	\$584	\$876	\$876	\$1,314	\$1,314	\$1,971	\$2,006	\$2,986	\$2,468	\$2,611	\$2,754	\$2,897	\$3,040	\$3,183	\$3,326	\$3,469
Buildings	\$5,824	\$11,648	\$11,648	\$23,296	\$23,296	\$34,944	\$34,944	\$52,416	\$52,416	\$78,624	\$80,592	\$120,888	\$98,400	\$104,704	\$111,008	\$117,312	\$123,616	\$129,920	\$136,224	\$142,528
Sub-Total	\$5,970	\$11,970	\$11,970	\$24,140	\$24,140	\$36,760	\$36,760	\$54,336	\$54,336	\$82,540	\$84,592	\$123,874	\$99,808	\$106,712	\$112,760	\$119,809	\$126,856	\$133,904	\$140,952	\$147,984
Net Change	\$94,938	\$306,769	\$470,527	\$691,937	\$872,234	\$1,093,844	\$1,273,940	\$1,481,339	\$1,661,636	\$1,883,046	\$2,123,552	\$2,405,172	\$2,645,678	\$2,927,298	\$3,167,804	\$3,449,624	\$3,689,930	\$3,930,098	\$4,184,663	\$4,451,341
40-Year TOTAL																				
Agricultural Zoned	(\$6,672)	(\$7,006)	(\$7,301)	(\$7,617)	(\$7,896)	(\$8,090)	(\$8,123)	(\$8,195)	(\$8,229)	(\$8,301)	(\$8,335)	(\$8,407)	(\$8,440)	(\$8,512)	(\$8,546)	(\$8,618)	(\$8,652)	(\$8,724)	(\$8,757)	(\$8,829)
Residential Zoned	(\$28,443)	(\$29,864)	(\$31,122)	(\$32,471)	(\$33,657)	(\$34,485)	(\$34,629)	(\$34,936)	(\$35,079)	(\$35,386)	(\$35,530)	(\$35,680)	(\$35,830)	(\$35,981)	(\$36,132)	(\$36,283)	(\$36,434)	(\$36,585)	(\$36,736)	(\$36,887)
Sub-Total	(\$35,115)	(\$36,870)	(\$38,423)	(\$40,089)	(\$41,553)	(\$42,575)	(\$42,752)	(\$43,131)	(\$43,308)	(\$43,687)	(\$43,864)	(\$44,037)	(\$44,200)	(\$44,373)	(\$44,536)	(\$44,700)	(\$44,863)	(\$45,026)	(\$45,189)	(\$45,352)
Improved Property Taxes																				
Retail																				
Land	\$724,660	\$789,202	\$846,326	\$907,510	\$961,475	\$999,084	\$1,005,601	\$1,019,536	\$1,028,953	\$1,039,989	\$1,046,505	\$1,060,441	\$1,066,968	\$1,080,893	\$1,087,410	\$1,101,345	\$1,107,862	\$1,121,797	\$1,128,314	\$1,142,249
Buildings	\$338,967	\$372,864	\$406,761	\$440,657	\$469,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554	\$474,554
Sub-Total	\$1,063,627	\$1,162,066	\$1,253,087	\$1,348,167	\$1,431,029	\$1,473,638	\$1,480,155	\$1,494,090	\$1,503,507	\$1,514,543	\$1,521,059	\$1,535,000	\$1,541,522	\$1,555,447	\$1,561,964	\$1,575,899	\$1,582,413	\$1,596,351	\$1,600,289	\$1,613,803
Office																				
Land	\$21,857	\$22,960	\$24,043	\$24,771	\$25,500	\$26,228	\$26,957	\$27,685	\$28,414	\$29,143	\$29,871	\$30,600	\$31,328	\$32,057	\$32,785	\$33,514	\$34,243	\$34,971	\$35,700	\$36,428
Buildings	\$201,857	\$212,298	\$222,739	\$229,699	\$236,660	\$243,621	\$250,581	\$257,542	\$264,502	\$271,463	\$278,424	\$285,384	\$292,345	\$299,305	\$306,266	\$313,227	\$320,187	\$327,148	\$334,108	\$341,069
Sub-Total	\$223,714	\$235,258	\$246,781	\$254,471	\$262,160	\$269,849	\$277,538	\$285,227	\$292,916	\$300,606	\$308,295	\$315,984	\$323,673	\$331,362	\$339,051	\$346,740	\$354,430	\$362,119	\$369,808	\$377,497
Industrial																				
Land	\$32,603	\$36,029	\$37,364	\$39,021	\$40,478	\$42,034	\$43,591	\$45,148	\$46,705	\$48,262	\$49,819	\$51,376	\$52,933	\$54,490	\$56,047	\$57,604	\$59,161	\$60,718	\$62,275	\$63,832
Buildings	\$302,648	\$317,780	\$332,912	\$343,001	\$353,089	\$363,177	\$373,265	\$383,354	\$393,442	\$403,530	\$413,619	\$423,707	\$433,795	\$443,883	\$453,972	\$464,060	\$474,148	\$484,236	\$494,325	\$504,413
Sub-Total	\$335,341	\$353,809	\$370,276	\$381,921	\$393,567	\$405,212	\$416,857	\$428,502	\$440,147	\$451,792	\$463,437	\$475,082	\$486,727	\$498,372	\$510,017	\$521,662	\$533,307	\$544,952	\$556,597	\$568,243
SP Residential																				
Land	\$91,695	\$96,064	\$100,532	\$105,000	\$109,468	\$113,936	\$118,404	\$122,872	\$127,340	\$131,808	\$136,276	\$140,744	\$145,212	\$149,680	\$154,148	\$158,616	\$163,084	\$167,552	\$172,020	\$176,488
Buildings	\$2,768,750	\$2,835,274	\$2,901,799	\$2,968,323	\$3,034,848	\$3,101,373	\$3,167,898	\$3,234,423	\$3,300,948	\$3,367,473	\$3,433,998	\$3,500,523	\$3,567,048	\$3,633,573	\$3,700,098	\$3,766,623	\$3,833,148	\$3,899,673	\$3,966,198	\$4,032,723
Sub-Total	\$2,860,445	\$2,931,338	\$3,002,331	\$3,073,323	\$3,144,315	\$3,215,307	\$3,286,299	\$3,357,291	\$3,428,283	\$3,499,275	\$3,570,267	\$3,641,259	\$3,712,251	\$3,783,243	\$3,854,235	\$3,925,227	\$3,996,219	\$4,067,211	\$4,138,203	\$4,209,195
MP Residential																				
Land	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853	\$4,853
Buildings	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139	\$194,139
Sub-Total	\$200,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000	\$199,000
Net Change	\$4,676,906	\$4,943,584	\$5,169,148	\$5,422,989	\$5,635,717	\$5,796,031	\$5,821,705	\$5,888,493	\$5,914,167	\$5,980,954	\$6,006,628	\$6,073,415	\$6,099,089	\$6,165,877	\$6,191,551	\$6,258,338	\$6,284,012	\$6,350,799	\$6,376,473	\$6,443,261
20-Year Supportable Public Investment @ 5%																				
40-Year Supportable Public Investment @ 5%																				
\$6,302,000																				
\$160,333,000																				

City of Liberty, MO
South Liberty Roadway Study

Supportable Public Investment Analysis

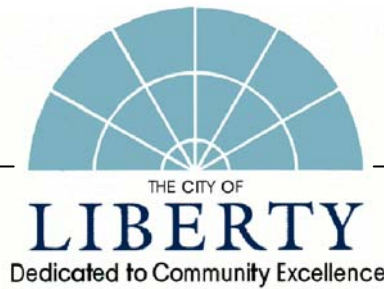
Appendix Table 8:
Retail Sales Tax Revenues and Supportable Public Investment

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Net New Sales Tax Revenues	\$0	\$326,479	\$326,479	\$652,958	\$652,958	\$979,436	\$979,436	\$1,305,915	\$1,305,915	\$1,632,394	\$1,632,394	\$1,958,873	\$1,958,873	\$2,285,352	\$2,285,352	\$2,611,830	\$2,611,830	\$2,938,309	\$2,938,309	\$3,264,788
20-YEAR TOTAL: \$32,648,000																				
Net New Sales Tax Revenues	\$3,264,788	\$3,591,267	\$3,591,267	\$3,917,746	\$3,917,746	\$4,244,225	\$4,244,225	\$4,570,703	\$4,570,703	\$4,897,182	\$4,897,182	\$5,223,661	\$5,223,661	\$5,550,140	\$5,550,140	\$5,876,619	\$5,876,619	\$6,203,097	\$6,203,097	\$6,529,576
40-YEAR TOTAL: \$130,592,000																				
20-Year Supportable Public Investment @ 5%	\$17,070,000																			
40-Year Supportable Public Investment @ 5%	\$38,837,000																			

Source: Economics Research Associates, 2005.

APPENDIX F:

SOUTH LIBERTY PARKWAY CORRIDOR TRAVEL DEMAND MODEL TECHNICAL REPORT



South Liberty Corridor Study Travel Demand Model Technical Report

1.0 Introduction

The following document outlines the process used in developing a travel demand model for the City of Liberty, Missouri. A travel demand model is a set of data and mathematical equations that attempt to replicate the trip making behavior of people, specifically, vehicle-oriented trips. This is typically done through the four-step process of trip generation, trip distribution, mode choice and traffic assignment. Through this four-step process, information regarding the impacts resulting from changes to transportation infrastructure, land use or public policy can be obtained without implementation. The travel demand model developed for the City of Liberty provides a tool for investigating the impacts caused by the construction of the South Liberty Parkway, although many other projects could also be analyzed. Figure 1.1 shows the model area for the Liberty travel demand model.

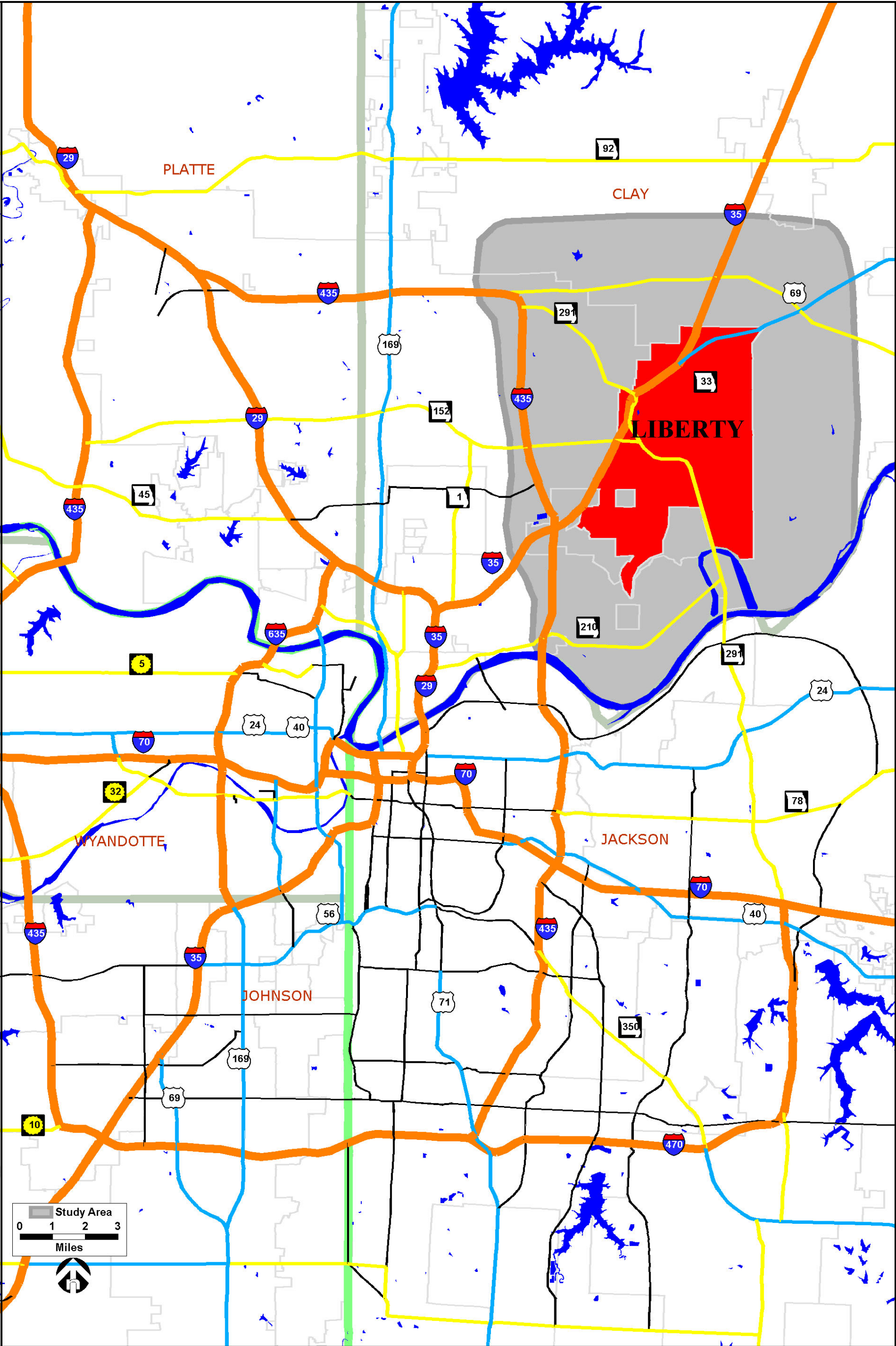
The Liberty travel demand model was developed as part of the South Liberty Corridor Study. Data collection was coordinated with the City of Liberty, by which extensive data was collected by city staff in support of the modeling effort. Additionally, meetings with city staff provided feedback on the modeling process.

Other studies referenced as part of the Liberty travel demand modeling process include:

- The City of Liberty Streets and Highways Element for the Transportation Plan Update (A Component of Blueprint for Liberty Comprehensive Plan), July, 2001.
- The Clay County Comprehensive Plan Update

2.0 Model Development

The Liberty travel demand model is a PM peak hour model. The travel demand modeling software used for the Liberty model was TransCAD version 4.0. The TransCAD package uses the traditional four-step modeling concept of trip generation, trip distribution, mode split and traffic assignment to produce traffic demand forecasts. The Liberty model does not utilize the mode split functionality of TransCAD as the transit ridership within the study area is sufficiently low. Therefore, all forecasts produced by TransCAD are assumed to be vehicle trips only.



Liberty Travel Demand Model Area



Figure 1.1

SOUTH LIBERTY CORRIDOR STUDY

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This model is more detailed than the MARC regional model, however, additional effort should be undertaken before using this model to conduct detailed local analysis. Additional network links in the immediate vicinity of the study may be needed, as well as disaggregation of land use into smaller geographic areas to better model local route selection. A calibration effort may also be warranted to ensure the added detail does not degrade the overall quality of the model.

2.1 MODEL ALTERNATIVES

The 2001 base model was used to calibrate the modeling parameters to existing traffic counts. The 2010 base scenario was analyzed to determine the impacts of constructing the South Liberty Parkway and associated land use. Priority between the completion of the South Liberty Parkway and the Flintlock extension was investigated in scenarios 1 through 3. The 2025 scenarios provide a long-range component to the Liberty travel demand model. The seven model scenarios are defined in Table 2.1.

Table 2.1
Travel Demand Model Alternatives

Land Use	Roadway Network				
	Base	“What If” Scenarios			
	Existing Roadway Network	Construct S. Liberty from Withers to M-291	Construct Flintlock from 76 th to S. Liberty and Relocate US 69	Construct Both S1 and S2	Eliminate I-435 Extension from the Eastern Bypass
Existing (2001)	B1 ^a				
2010	B2^b	S1^b	S2 ^b	S3 ^b	
2025	B3^b				S4 ^b

a. Calibrated model of existing conditions.

b. Includes committed and planned projects identified in Table 2.2.

More detailed traffic operational analysis was performed for Alternatives that are in red.

Alternatives analyzed represent a combination of land use and roadway network modifications. Table 2.1 identifies the alternatives analyzed using the travel demand model. Three alternatives that are in red represent alternatives that were analyzed in more detail using a simulation model.

Base Model Runs

- **Base 1 (B1)** – The calibrated model. This alternative contains existing land use and the existing roadway network.
- **Base 2 (B2)** – The 2010 base condition. It contains 2010 land use and 2010 committed and planned projects.
- **Base 3 (B3)** – The 2025 base condition. It contains 2025 land use and 2025 committed and planned projects.

Table 2.2
Committed and Planned Projects

ID	Year	Road	To/From	Improvement	Source
Committed Projects					
1	2010	Flintlock Road	76 th St. to Liberty Drive	New Overpass	Liberty Staff
2	2010	M-152	M-291 to I-35	Widen to 6 Lanes	Liberty Staff
3	2010	South Liberty Rdwy	I-35 to Withers Road	New 4 Lane Facility	Liberty Staff
4	2025	Parvin Road	I-435 to Hughes Road	Widen to 4 Lanes	Liberty Staff
5	2010	M-291 Interchange	I-35 Interchange	Ramps to Glen Hedren	Liberty Staff
6	2010	US 69/M-33/I-35	Intersection	Add. Lanes	Liberty Staff
Planned Projects					
20	2010	South Liberty Rdwy.	Withers Road to M-291	New 4 Lane Facility	MARC
21	2025	N.E. 96 th St.	Shoal Cr Pkwy to Reinking Rd.	New 4 Lane Facility	MARC
22	2010	Shoal Creek Parkway	I-435 to Barry Road	New 4 Lane Facility	MARC
23	2010	Shoal Creek Parkway	Barry Road to 96 th St.	New 4 Lane Facility	MARC
24	2025	Pleasant Valley Road	I-35 Interchange	Interchange Modifications	MARC
25	2025	M-152 Interchange	I-35 Interchange	Interchange Modifications	MARC
26	2025	M-33	US 69 to Collector A	Widen to 4 Lanes	MARC
27	2025	Route B	Route H to US 69	Improved 2 Lanes	MARC
28	2025	Route H	Route B to Mill Street	Improved 2 Lanes	MARC
29	2025	I-435 Extension	I-435 to I-35	New 4 Lane Facility	MARC
30	2025	I-35	Study Area	Widen to 6 Lanes	MARC/Ass.
31	2025	N.E. 108 th St.	I-435 to Reinking Rd.	New 4 Lane Facility	MARC
32	2025	Eastern Bypass	M-210 to US 69	New 4 Lane Facility	City Plan
33	2010	Claywoods Parkway	Connect Existing Segments	New 2 Lane Facility	City Plan
34	2025	Hughes Road	South Liberty to M-210	New 2 Lane Facility	KC,MO
35	2025	N.E. 48 th St.	I-435 to Hughes Rd.	New 2 Lane Facility	KC,MO
36	2010	M-210	M-210 Development District	Widen to 4 Lanes	MARC
37	2025	Shepherd Road	Lightburne to Eastern Bypass	New 2 Lane Facility	City Plan
38	2010	Collector B	Glen Hedren to Lightburne	New 2 Lane Facility	City Plan
39	2025	Collector C	Plattsburg to Route A	New 2 Lane Facility	City Plan
40	2025	Withers Road	South Liberty to Hughes Rd	New 4 Lane Facility	City Plan
41	2010	Collector A	Withers Rd to Birmingham	New 2 Lane Facility	City Plan
42	2025	LaFrenz Rd.	Ruth Ewing Rd. to M-210	New 2 Lane Facility	City Plan
43	2025	Ruth Ewing Rd.	M-291 to Eastern Bypass	New 2 Lane Facility	City Plan
44	2010	N.E. 76 th St.	I-435 to Flintlock	Widen to 4 Lanes	KC,MO
45	2025	N.E. 96 th St.	Shoal Creek to M-291	Widen to 4 Lanes	KC,MO
46	2025	I-435	Route A	Interchange	Assumption
47	2025	Seven Hills Rd.	Birmingham to M-291	New 2 Lane Facility	Liberty Staff
48	2010	Buckingham Dr.	South Wales to Withers Rd.	New 2 Lane Facility	Liberty Staff
49	2010	MidJay Drive	Stewart to Liberty Dr.	New 2 Lane Facility	Liberty Staff
50	2010	Robertson Pkwy	M-291 to Claywoods Pkwy.	New 2 Lane Facility	Liberty Staff
51	2025	Flintlock Extension	South Liberty Pkwy. to US 69	New 4 Lane Facility	Liberty Staff

Source represents where the improvement originated: Liberty Staff – Identified committed projects in the next 5 to 10 years. MARC – 2030 Long-Range Transportation Plan. City Plan – Liberty Comprehensive Transportation Plan, July 2001. KC,MO – Major Street Plan. Only projects that directly serve 2025 land use demand were identified. Assumption – Additional assumptions not identified in any plans.

“What If Scenario” Model Runs

- **Scenario 1 (S1)** – The 2010 base condition (B2) plus construction of South Liberty from Withers to M-291.
- **Scenario 2 (S2)** – The 2010 base condition (B2) plus construction of Flintlock from 76th to S. Liberty and relocation of US 69.
- **Scenario 3 (S3)** – The 2010 base condition (B2) plus construction of S1 and S2.
- **Scenario 4 (S4)** – The 2025 base condition (B2) but eliminate I-435 extension and the eastern bypass.

2.2 MODEL NETWORK

TransCAD is a geographic information system (GIS) with contains fully functional travel demand modeling algorithms. This allowed the Liberty travel demand model network to be created from existing GIS datasets. A majority of the Liberty model network lies within the limits of the City of Liberty, therefore, a roadway centerline file was used as a base. Many roadway data attributes needed for the demand model such as speed and number of lanes were stored within this attribute file. A centerline file for Clay County, Missouri was used to develop the network for areas outside of Liberty. Due to data accuracy in the Clay County centerline files, some manual editing of centerlines to aerial photography was needed.

The Liberty and Clay County roadway centerline data sets were combined within TransCAD to form one street coverage for the Liberty model network. Roadways with impassable medians were dualized to create two one-way links. Figure 2.1 shows the 2001 Liberty model network.

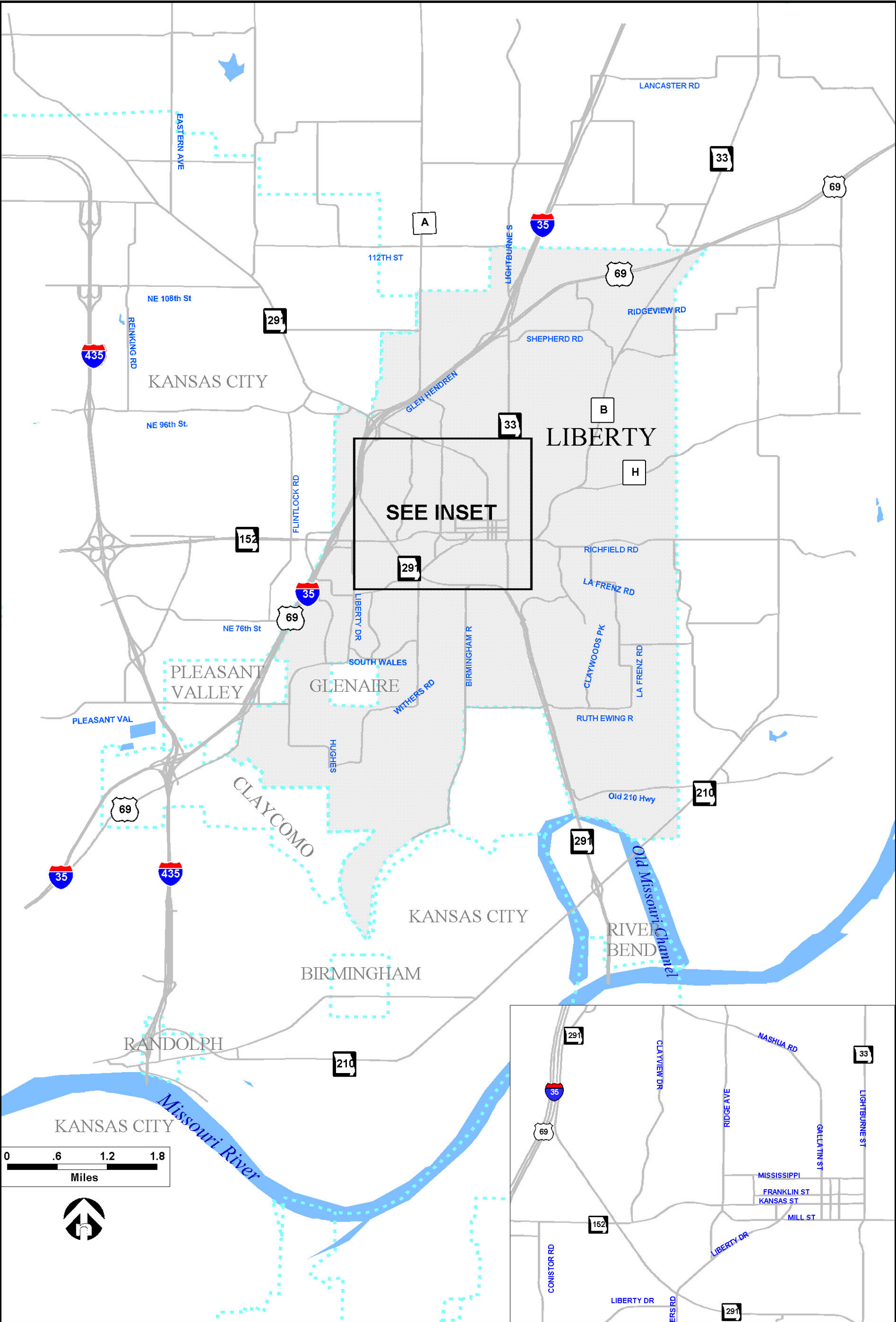
Roadway attributes were then coded for each link in the Liberty travel demand model. Speed and number of lanes were obtained from aerial photography and field visits. Capacities were calculated based on NCHRP 365¹ standards, the functional class of the roadway and the number of lanes. Table 2.3 shows the standard capacity of roadways within the model network based on their functional classification. Figure 2.2 shows the number of lanes in the 2001 model network.

Table 2.3
Roadway Capacity

Functional Classification	Roadway Capacity (vphpl) ^a
Freeway	2,200
Arterial (Non-Signalized)	1,400
Arterial (Signalized)	1,200
Collector	800
Rural Arterial	1,200
Rural Collector	500
Centroid Connector	10,000

^aVehicles per hour per lane (vphpl)

¹ National Cooperative Highway Research Program, Report 365, Travel Estimation Techniques for Urban Planning, Transportation Research Board, National Research Council, National Academy Press, Washington, D.C., 1998.



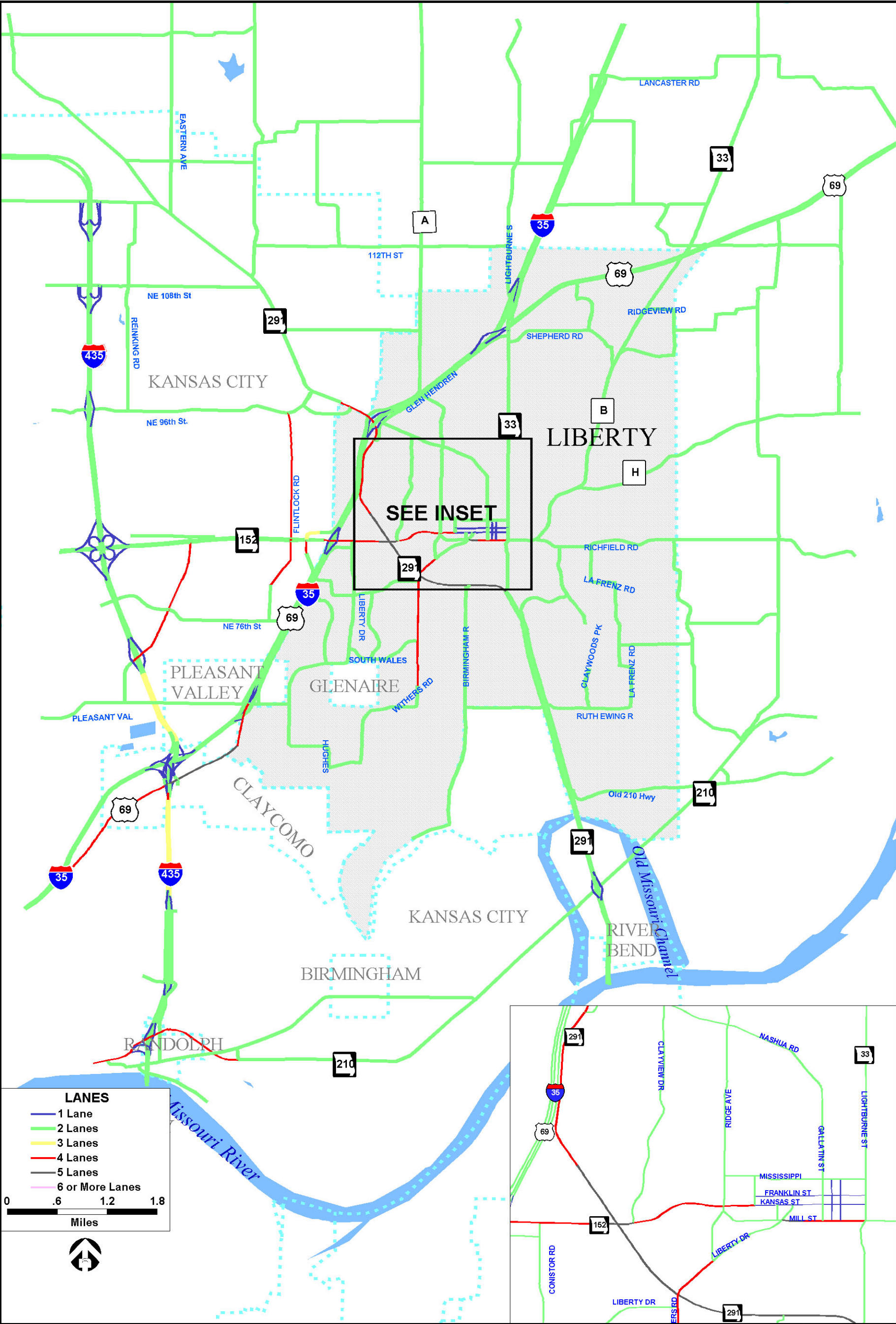


Figure 2.2

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Intersection turning penalties were added to the Liberty travel demand model to more accurately model PM peak hour traffic patterns. Turn penalties were added to all intersections identified as traffic signals, stop or yield controlled. A level of service of C was assumed in calculating the delay for each movement. All prohibited movements were assigned a turning penalty of 99 minutes. Table 2.4 shows the standard turn penalties assigned to each intersection.

Table 2.4
Standard Turning Penalties

Traffic Control Type	Seconds of Delay		
	Left Turn	Through	Right Turn
Signal (No Progression)	25	25	12
Signal (Progression)	25	12	12
Stop	20	20	10
Yield	10	10	3

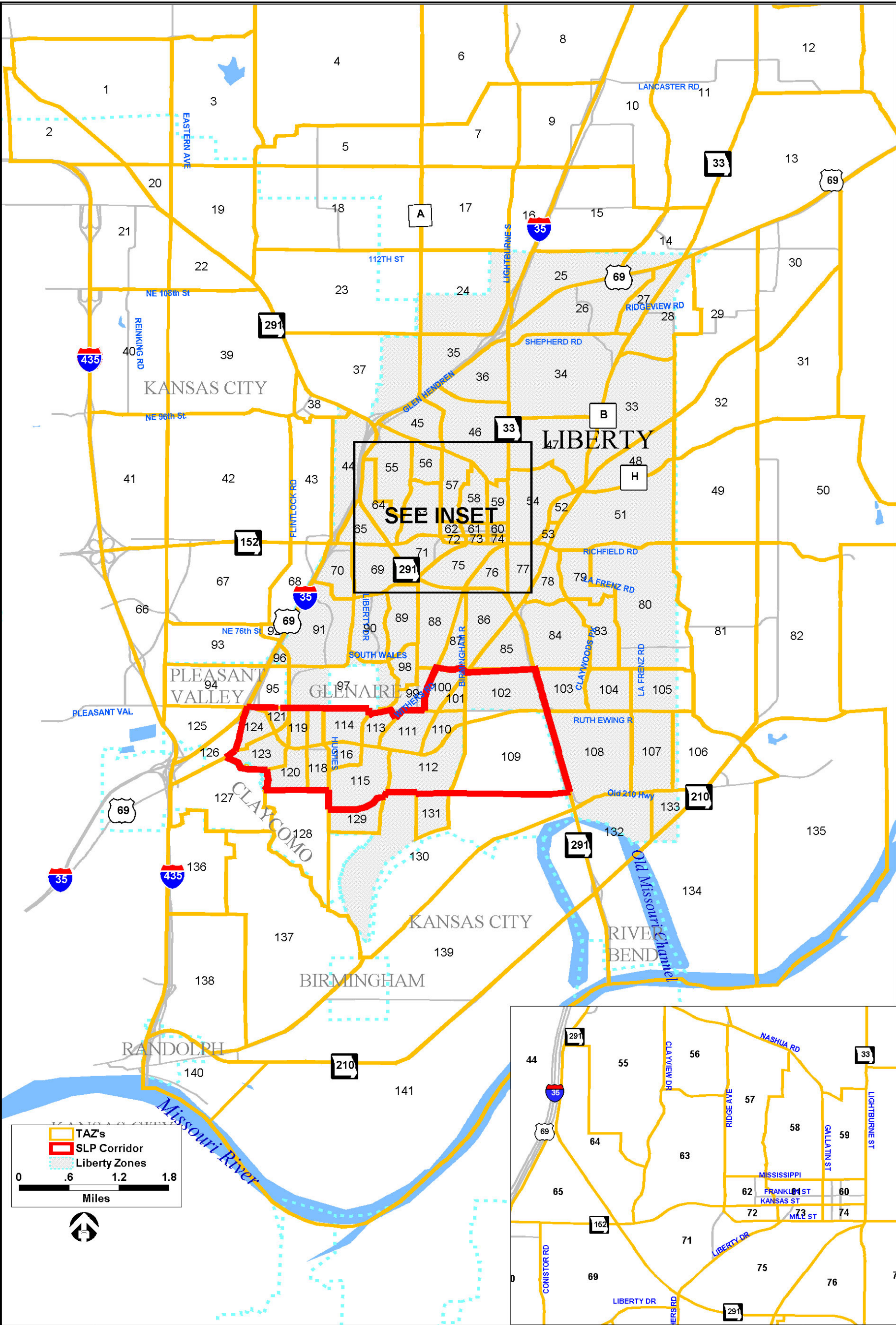
2.3 TRAFFIC ANALYSIS ZONES

Traffic analysis zones (TAZ) represent a geographic area within the travel demand model in which land uses are aggregated to produce the origin or destination of trips. TAZ's were created in TransCAD using roadway network, census blocks and land parcel information. TAZ boundaries were drawn to keep parcels entirely within a zone. In areas where intense development was planned, such as the South Liberty corridor, TAZ's were divided into smaller zones to allow for more detailed analysis. Since Liberty travel patterns are affected by areas outside of Liberty, there are many TAZ's beyond the limits of Liberty. Figure 2.3 shows the TAZ's for the Liberty travel demand model.

Centroids represent the point at which all trips going to or from a TAZ interact with the model network. To connect centroids to the network, centroid connectors are added. The centroid connectors typically represent the local streets within the TAZ and were constructed so as to connect with the model network similar to the actual local street intersections.

2.4 SOCIO-ECONOMIC DATA

Socio-economic data, such as household and employment location information, were used as inputs to the travel demand modeling process. These data are used in the trip generation process which produces an estimate of the number of trips that originate or terminate at each TAZ. Typically, the decennial census provides a reliable source of socio-economic data. However, at the time of the Liberty travel demand model development, the year 2000 census data was not available and significant growth had occurred in some locations since the 1990 census. For the Liberty travel demand model, the socio-economic data was collected by the City of Liberty from Clay County data.



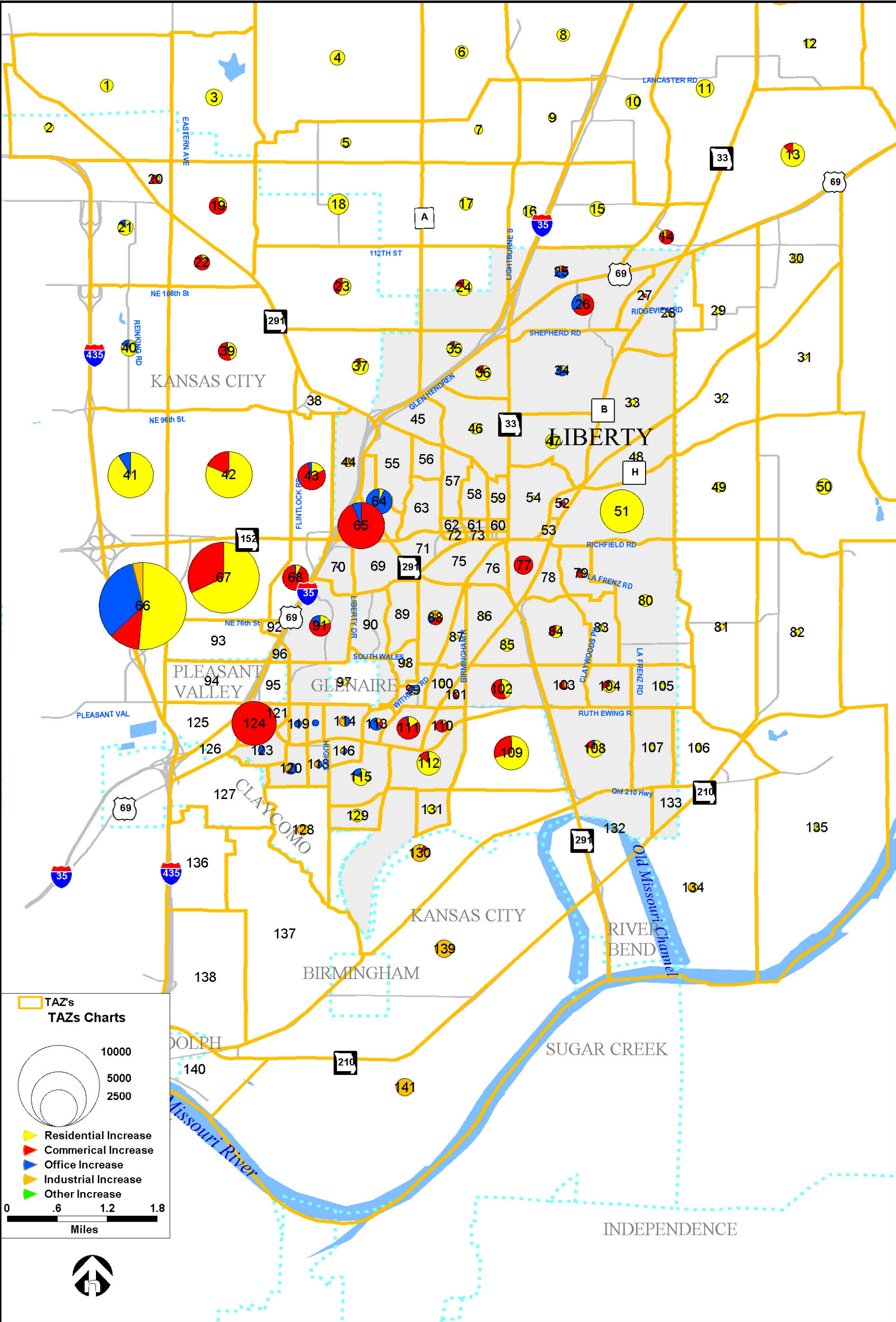
The socio-economic data was divided into categories reflecting the trip making attributes of the land use type. The household data was first divided into single-family and multi-family. The single-family was further subdivided into three income levels representing low, medium and high income brackets. Income was not available at the dwelling unit level, so the assessed value of the single-family dwelling unit was used as a surrogate variable for income. The data was collected into number of dwelling units within each category per TAZ. Non-residential land uses were divided into ten categories. The land use categories for the Liberty model include:

- Single-Family Housing, Low Income	Dwelling Units
- Single-Family Housing, Medium Income	Dwelling Units
- Single-Family Housing, High Income	Dwelling Units
- Multi-Family Housing	Dwelling Units
- Commercial (Non-Auto Oriented)	1,000 S.F. of Floor Space
- Commercial (Auto Oriented)	1,000 S.F. of Floor Space
- Office	1,000 S.F. of Floor Space
- Industry	1,000 S.F. of Floor Space
- Hotel	1,000 S.F. of Floor Space
- Church	1,000 S.F. of Floor Space
- Nursing Home	1,000 S.F. of Floor Space
- Park	Acres
- Day Care	1,000 S.F. of Floor Space
- Mixed Residential	Dwelling Units
- Mixed Commercial	1,000 S.F. of Floor Space

Non-residential land use data was collected by the number of square feet of each category. Additionally, special generators were identified that have trip making attributes that are likely to vary from the previously listed land use types. The special generators required extra attention to categorize the number and type of trips associated with the land use. These special generators include:

- Hallmark	Zone 34
- Liberty Hospital	Zone 36
- Elementary Schools	Zone 42,55,75,79 & 91
- Golf Courses	Zone 42 & 47
- William Jewell	Zone 54
- Jr./Sr. High Schools	Zone 59, 62, 69 & 98
- Ford Plant	Zone 127
- Sub Tropolis	Zone 138
- Worlds/Oceans of Fun	Zone 138
- Ameristar Casino	Zone 140

Future socio-economic data was developed by the City of Liberty for both a 2010 and 2025 forecast year. Planned developments and future zoning plans were translated into residential and non-residential units in the same manner as the existing socio-economic data. Figure 2.4 shows the growth in land use throughout the Liberty travel demand model study area. Appendix A shows the socio-economic data for the years 2001, 2010 and 2025.



Growth in Land Use from 2001 to 2025

HNTB

Figure 2.4

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3.0 Model Process

3.1 TRIP GENERATION

Trip generation is the estimation of the number of trips that occur based on known variables of a land development. The Institute of Transportation Engineers (ITE) Trip Generation Manual² provides PM peak hour estimates for the various land use categories of the Liberty model. The national average rates of the ITE manual were supplemented with local data. This PM peak hour approach was used to provide peak hour traffic forecasts for traffic operations analysis.

The residential land use types were divided into three single-family and two multi-family categories. This allowed for a more detailed trip generation rate to be applied to each land use category. Commercial land uses were also divided into two categories, auto-oriented and non-auto-oriented. The auto-oriented trips included small commercial land uses that catered to automobile traffic, such as gas stations, drive-thru banks and fast-food restaurants. These land use types generally have a higher number of trips generated, thereby necessitating a distinct trip generation rate. Table 3.1 shows the trip generation rates for each land use type, along with the percent of trips entering and exiting during the PM peak hour.

Table 3.1
Trip Generation Rates

Land Use Types	Units	Trip Rate	Percent In	Percent Out
Single Family, Low Income	DU	0.60	60	40
Single Family, Medium Income	DU	1.05	60	40
Single Family, High Income	DU	1.17	60	40
Multi-Family Residential	DU	1.05	67	33
Commercial, Non-Auto Oriented	KSF	5.00	55	45
Commercial, Auto Oriented	KSF	20.00	55	45
Office	KSF	1.68	17	83
Industrial	KSF	0.88	12	88
Hotel	KSF	0.71	49	51
Church	KSF	0.66	54	46
Nursing Home	KSF	0.23	64	36
Park	Acres	0.06	41	59
Day Care	KSF	13.2	47	53
Mixed Residential	DU	0.62	67	33
Mixed Commercial	KSF	4.82	50	50

Source: Trip Generation, ITE 6th Edition

There are many different reasons for making a trip. These different reasons may impact the characteristics of these trips. Therefore, the generated trips are divided into trip types, each with a set of unique characteristics. The trips in the PM peak hour model are divided into the following five internal types.

² Trip Generation, 6th Edition, Institute of Transportation Engineers, 525 School St., S.W. Suite 410, Washington, D.C., 20024, 1997.

- Home to Work(HW) – Trips originating at home and terminating at work
- Work to Home (WH) – Trips originating at work and terminating at home
- Home to Other(HO) – Trips originating at home and terminating at a non-work location
- Other to Home(OH) - Trips originating at a non-work location and terminating at home
- Non-Home Based(NHB) – Trips originating and terminating at non-home locations

NCHRP 365³ Table 42 provided an estimate of the percent of total trips by trip type. Appendix B shows the trip type percentages for each land use type.

Trip origins and destinations were obtained by using the percent of trips into and out of each land use type. The directionality of productions and attractions resulted in the directional trip tables needed for the peak hour traffic assignment. Table 3.2 shows the balanced number of trips produced for the three modeled scenarios.

Table 3.2
Number of Trips Generated by Trip Type

Forecast Year	Number of Trips Generated						Total
	HW ^a	WH ^a	HO ^a	OH ^a	NH ^a	EXT ^a	
2001	1,619	8,303	6,132	6,121	6,934	6,501	35,610
2010	1,956	10,667	7,862	7,842	9,060	9,308	46,695
2025	3,321	22,408	16,986	17,199	16,854	13,718	90,485

a. HW = home to work trip, WH = work to home trip, HO = home to other trip, OH = other to home trip, NH = non-home based trip, EXT = external to external trip

3.2 TRIP DISTRIBUTION

The productions and attractions generated for each directional trip type were converted to trip origins and destinations through the process of trip distribution. This process uses the standard gravity model algorithm within TransCAD. In addition to the balanced productions and attractions, a friction factor table, shortest path matrix and K-factor matrix are required inputs for trip distribution. The friction factor table used for the Liberty travel demand model is found in the NCHRP 365.

The shortest path matrix is created by TransCAD and represents the shortest travel time between all zone pairs. An intrazonal travel time is added to replicate the approximate time to travel within a traffic analysis zone. The TransCAD algorithm to calculate this intrazonal time is used, by calculating the average travel time to the ten closest zones and using a factor of 3.

The Liberty travel demand model contains several regional destinations, requiring additional inputs to realistically model their impact to traffic demand within the study area. These regional destinations include the Ford Motor Plant in Claycomo, Ameristar Casino, Worlds of Fun and Oceans of Fun in Kansas City. It is expected that a majority of trips associated with these locations would come from outside the Liberty travel demand model study area. K-factors were also used to prohibit external-internal and internal-external trips from being distributed between

³ National Cooperative Highway Research Program, Report 365, Travel Estimation Techniques for Urban Planning, Transportation Research Board, National Research Council, National Academy Press, Washington, D.C., 1998.

two external stations. Appendix C shows non-unity K-factors used for the Liberty travel demand model.

Productions and attractions for the five directional trip types were input into the gravity model. This produced five trip tables, one each for home to work, work to home, home to other, other to home and non-home based. These five trip tables were then combined with the external trip table to produce one trip table for input into the traffic assignment process.

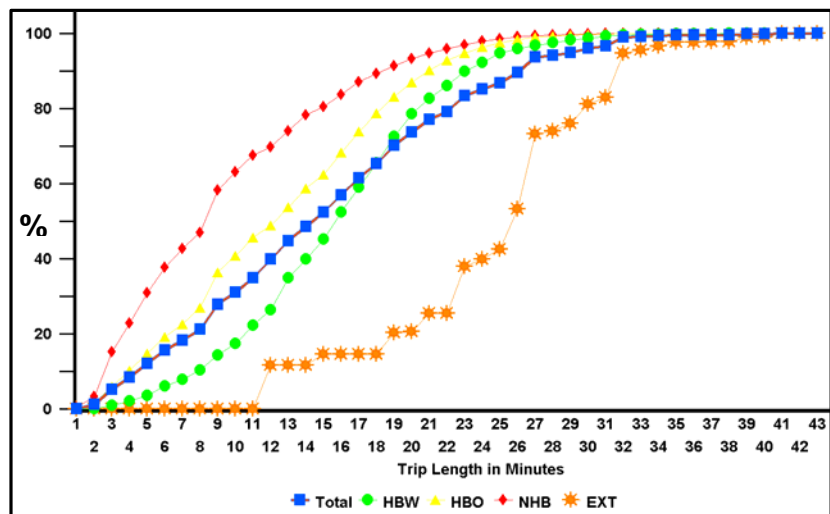
3.3 EXTERNAL TRIPS

The external trip tables used for the Liberty travel demand model were derived from the MARC regional models. MARC staff used a subarea analysis process to obtain external trip tables and external/internal trip exchanges for the Liberty study area. The PM peak hour models used to determine the external trip tables were not as highly calibrated as the daily model so some post-processing was required. The initial external trip tables and external productions and attractions were factored using existing traffic counts. These same factors were applied to the future year trip tables. Some minor modifications were also made to the number of trips between some origin-destination pairs to produce a more realistic condition.

3.4 TRIP LENGTH DISTRIBUTION

The trip length distribution for the year 2001 model shows that the model through trips have the largest proportion of long trip lengths. This would be expected as these trips must travel across the entire study area. Home-based work trips have the longest trip length of the internal trip types, while the non-home based trips are the shortest trips. Figure 3.1 shows the cumulative trip length distribution for the three internal trip types, the external trips and the total trip table for the year 2001 model.

Figure 3.1
Cumulative Trip Length Distribution for 2001 Model



The trip length distribution is expected to change slightly as more development continues to occur farther from the existing areas of Liberty.

3.5 TRAFFIC ASSIGNMENT

Traffic volumes by link are calculated through the traffic assignment process. This process uses the trip table and the roadway network to estimate the number of trips that use each link in the network. Several traffic assignment methods within TransCAD were investigated, but the user

equilibrium method was found to best replicate existing traffic counts through the calibration process.

The user equilibrium method is described in the Travel Demand Modeling with TransCAD 4.0 User's Manual⁴ as "...an iterative process to achieve a convergent solution, in which no travelers can improve their travel times by shifting routes. For each iteration, network link flows are computed, which incorporate link capacity restraint effects and flow-dependent travel times." This simply states that each trip is assigned to the route with the shortest travel time when delay due to congestion is considered. The travel times are recalculated using the following formula:

$$T = T_f \left[1 + \alpha (v / c)^\beta \right]$$

T = Computed Travel Time

T_f = Uncongested Travel Time

α = Alpha

v = Assigned Volume

c = Capacity

β = Beta

Alpha and beta parameters were input into the network and were based on functional class.

- | | | |
|------------------|-----------------|---------------|
| • Freeways | $\alpha = 0.3$ | $\beta = 5.5$ |
| • Other roadways | $\alpha = 0.15$ | $\beta = 7.0$ |

The output of the traffic assignment process is a link by link forecast of traffic volume. Congested travel speeds by link are also output and are used to estimate the amount of delay experienced by vehicles. Volume to capacity ratios indicate the expected level of congestion on each link. The user equilibrium process was also utilized to create turning movements and select link and zone analyses.

3.6 CALIBRATION

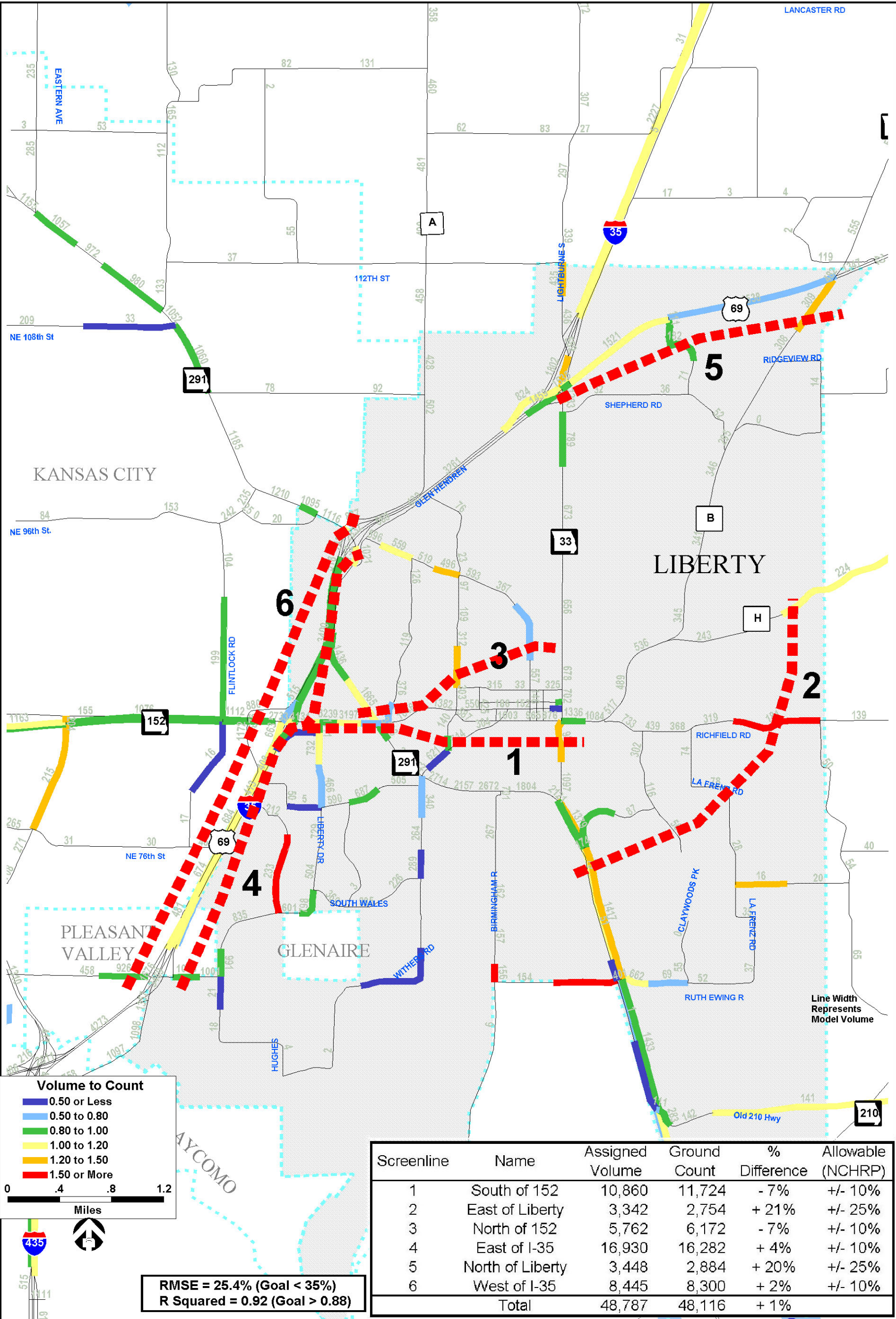
Calibration is the process of adjusting parameters to better replicate known conditions. Trip generation rates and trip type percentages were varied to best match NCHRP recommendations for percent of trips by trip type. Overall volume to ground count ratios were also used to revise trip generation rates. K-factors were modified to best replicate movements from the regional destinations within the model area. Alpha and beta parameters were adjusted to more accurately predict the impacts of traffic congestion.

Six screenlines were constructed to analyze the major movements through the study area. NCHRP 255⁵ established acceptable values for the ratio between model volumes and ground

⁴ Travel Demand Modeling with TransCAD 4.0 User's Manual, 2001 Caliper Corporation

⁵ National Cooperative Highway Research Program Report 255, Highway Traffic Data for Urbanized Area Project Planning and Design, Transportation Research Board, National Research Council, National Academy Press, Washington, D.C., December, 1982.

counts. System effectiveness was also established through the use of the root mean square error (RMSE) and R-squared measures. Figure 3.2 shows the screenline results and the RMSE and R-squared measures for the Liberty travel demand model and the acceptable ranges established by NCHRP 255. The Liberty travel demand model is well within all acceptable ranges for error.



APPENDIX G:

SOUTH LIBERTY PARKWAY CORRIDOR
SOCIO-ECONOMIC DATA

Appendix D Socio-Economic Data

Table D.1 2001 Socio-Economic Data

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	PARK (ACRES)	DAY CARE (SF)	MIX RES (UNITS)	MIX COM (SF)	Special Gen
1	0	0	18	0	2032	0	0	0	0	0	0	0	0	0	0	
2	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	129	0	0	0	0	0	0	1984	0	0	0	0	0	
4	3	11	126	2	0	0	0	0	0	0	0	0	0	0	0	
5	0	3	15	0	0	0	0	0	0	0	0	0	0	0	0	
6	1	5	42	0	0	0	0	0	0	0	0	0	0	0	0	
7	0	1	42	0	0	0	0	0	0	0	0	0	0	0	0	
8	0	5	39	0	0	0	0	0	0	0	0	0	0	0	0	
9	0	1	39	0	0	0	0	0	0	0	0	0	0	0	0	
10	1	2	5	0	0	0	0	0	0	0	0	0	0	0	0	
11	0	2	167	0	0	0	0	0	0	0	0	0	0	0	0	
12	0	3	53	0	0	0	0	0	0	0	0	0	0	0	0	
13	0	2	28	23	0	0	0	0	0	0	0	0	0	0	0	
14	3	1	20	94	0	0	0	0	0	6435	0	0	0	0	0	
15	1	1	18	0	0	0	0	0	0	0	0	0	0	0	0	
16	0	1	13	0	0	0	0	0	0	2857	0	0	0	0	0	
17	0	2	41	0	0	0	0	0	0	0	0	0	0	0	0	
18	0	11	45	0	0	0	0	0	0	0	0	0	0	0	0	
19	1	0	427	0	0	0	0	0	0	0	0	0	0	0	0	
20	1	0	12	0	0	0	0	0	0	0	0	0	0	0	0	
21	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	
22	0	0	75	0	0	0	0	26600	0	0	0	0	0	0	0	
23	0	4	177	0	0	0	0	0	0	0	0	0	0	0	0	
24	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26	0	1	1	0	0	2496	0	440866	0	1924	0	0	0	0	0	
27	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	
28	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	
29	0	1	16	0	0	0	0	13260	0	4275	0	0	0	0	0	
30	0	2	13	0	0	0	0	0	0	0	0	0	0	0	0	
31	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	
32	0	2	51	0	0	0	0	0	0	0	0	0	0	0	0	
33	0	1	16	0	0	0	0	0	0	0	0	0	0	0	0	
34	0	9	6	0	0	0	0	0	0	0	0	0	0	0	0	HM
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
36	0	0	59	0	0	0	0	0	0	0	40191	0	0	0	0	LH
37	0	5	262	106	0	10756	0	0	0	0	0	37	0	0	0	
38	0	0	21	0	6983	0	0	0	0	0	0	0	0	0	0	

Appendix

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	PARK (ACRES)	DAY CARE (SF)	MIX RES (UNITS)	MIX COM (SF)	Special Gen
39	0	1	130	180	0	0	0	0	0	0	0	0	0	0	0	
40	0	3	10	0	0	0	0	0	0	0	0	0	0	0	0	
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
42	0	0	217	0	0	0	0	0	0	0	0	800	0	0	0	SCES/ HGC/SGH
43	0	0	1	0	8880	39374	0	0	0	0	0	0	0	0	0	
44	0	1	10	0	121608	11010	0	32394	64584	143595	0	0	0	0	0	
45	0	29	230	4	0	0	0	0	0	0	0	0	0	0	0	
46	0	7	439	0	0	0	0	0	0	0	0	0	0	0	0	
47	1	5	8	0	0	0	978	0	0	7336	0	0	0	0	0	CGC
48	0	1	9	0	0	0	4000	27576	0	0	0	0	0	0	0	
49	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	
50	1	4	46	0	0	0	0	0	0	0	0	0	0	0	0	
51	1	11	98	0	0	0	0	3645	0	3931	0	0	0	1	7200	
52	0	1	1	3	0	0	0	0	0	0	0	0	0	0	0	
53	1	3	0	50	0	0	1868	4301	0	0	0	0	0	0	0	
54	17	46	36	76	2838	15276	0	0	0	15468	0	0	0	0	0	WJC
55	0	17	280	2	0	0	0	4583	0	28809	0	32	0	0	0	LCES
56	1	14	133	2	0	0	0	0	0	5820	0	13	0	0	0	
57	14	50	215	5	0	0	0	0	0	0	0	0	0	0	0	
58	49	126	62	377	0	0	0	0	0	1752	0	9	0	0	0	
59	26	63	38	126	0	0	0	0	3006	12222	0	0	0	0	0	G
60	4	15	4	84	138009	8318	15714	2013	0	62559	0	0	0	0	0	
61	11	32	19	24	3286	0	6556	0	0	0	0	0	0	0	0	
62	2	27	10	12	0	0	0	0	0	0	0	0	0	0	0	JRS
63	0	4	149	223	5909	0	158840	0	0	2121	0	0	0	0	0	
64	0	1	5	65	31343	45972	33322	3800	21860	15532	43652	0	0	0	0	
65	0	0	3	0	104424	8480	4476	2369	12398	8809	0	0	0	0	0	
66	0	1	246	2	0	0	0	0	0	0	0	0	0	0	0	
67	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	
68	0	0	0	112	24644	63405	0	0	82377	0	0	0	0	0	0	
69	0	53	82	160	149496	65426	100060	0	0	7885	0	0	4960	0	0	HS/LA
70	0	4	9	0	183254	5744	28664	0	0	2924	0	0	0	0	0	PS
71	6	96	77	225	107360	20284	29094	3040	0	68334	0	0	0	1	2100	
72	1	26	15	15	0	0	0	0	0	0	0	0	0	0	0	
73	3	12	6	9	12648	0	24124	5300	0	0	0	0	3000	0	0	
74	0	0	0	3	27006	13304	40523	0	0	0	0	0	0	0	0	
75	26	253	28	9	49001	4437	1468	11631	0	1044	0	12	0	0	0	FES/RES
76	25	130	35	124	6944	4272	2562	9303	0	2908	0	0	0	0	0	
77	28	91	24	113	7800	2900	0	150269	0	2986	0	0	2400	0	0	
78	0	8	213	149	0	0	0	0	0	0	0	0	0	0	0	
79	0	4	131	0	1170	0	0	0	0	0	0	0	0	0	0	LSES
80	1	8	62	0	0	0	0	0	0	0	0	112	0	0	0	
81	2	4	34	0	0	0	0	1444	0	0	0	0	0	0	0	

Appendix

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	PARK (ACRES)	DAY CARE (SF)	MIX RES (UNITS)	MIX COM (SF)	Special Gen
82	1	9	59	0	0	0	0	0	0	1248	0	0	0	0	0	
83	0	1	19	0	0	0	0	0	0	0	0	0	0	0	0	
84	0	0	153	0	251	0	0	0	0	0	0	0	0	0	0	
85	0	5	5	34	0	0	0	18000	0	4590	0	0	0	1	1425	
86	0	281	120	155	0	9668	0	0	0	0	0	0	0	0	0	MHES
87	0	5	191	0	0	0	0	2724	0	5826	0	0	0	0	0	
88	0	0	79	0	211757	38340	39680	266650	0	60416	0	0	0	0	0	
89	0	108	307	0	0	0	0	0	0	0	0	23	0	0	0	
90	0	0	567	0	0	0	0	0	0	14569	0	18	0	0	0	
91	0	119	343	58	0	2400	56434	0	0	0	0	12	0	0	0	ADES
92	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
93	1	49	770	137	0	0	0	0	0	0	0	0	0	0	0	
94	8	118	413	242	0	7722	0	0	0	49868	27054	0	0	0	0	
95	1	22	4	24	8840	0	20676	63759	0	0	0	0	0	0	0	
96	0	0	0	98	0	0	0	0	0	0	0	0	0	0	0	
97	15	92	276	7	0	0	0	0	0	0	0	0	0	0	0	
98	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	MS
99	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	
100	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	
101	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	
102	0	61	105	0	0	0	0	0	0	16270	66057	0	0	0	0	
103	0	0	260	165	0	0	0	0	0	0	0	0	0	0	0	
104	0	2	62	0	0	0	0	0	0	0	0	0	0	0	0	
105	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	
106	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
107	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
108	0	53	52	196	1788	0	0	152160	0	0	0	0	0	0	0	
109	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
111	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	
112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
113	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
114	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
116	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	
117	0	0	0	0	0	0	0	0	0	32182	0	0	0	0	0	
118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
119	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
122	0	0	0	0	0	0	0	0	0	9555	0	0	0	0	0	
123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
124	0	0	0	0	0	0	0	2496	0	3452	0	0	0	0	0	

Appendix

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	PARK (ACRES)	DAY CARE (SF)	MIX RES (UNITS)	MIX COM (SF)	Special Gen
125	23	106	83	0	0	0	0	75080	0	0	0	0	0	0	0	
126	35	21	3	175	12648	17430	5952	3474	0	0	0	0	0	1	3196	
127	0	3	10	0	0	0	0	18500	0	5156	0	0	0	0	0	Ford
128	0	0	0	0	600	0	0	0	0	0	0	0	0	0	0	
129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
130	0	0	0	0	1800	0	0	0	0	0	0	0	0	0	0	
131	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
132	0	0	0	0	0	0	0	3600	0	0	0	0	0	0	0	
133	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
134	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	
135	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	
136	1	1125	201	0	0	0	0	0	0	10376	0	0	0	0	0	
137	21	3	2	0	0	0	0	9520	0	572	0	0	0	0	0	HMW
138	0	2	1	0	112808	79648	0	291557	14016	0	0	0	0	0	0	WOF/OOF /HMW
139	39	45	16	0	0	4680	0	679224	0	2648	0	0	0	0	0	
140	10	12	2	0	0	0	5130	34250	0	1900	0	0	0	0	0	AS
141	2	17	16	0	0	0	0	1317808	0	0	0	0	0	0	0	
Study Area	389	3,503	9,316	3,669	1,345,127	481,342	580,121	3,681,196	198,241	630,138	176,954	1,068	10,360	4	13,921	
Liberty SL	232	1,888	5,088	2,475	1,165,892	258,327	548,363	1,146,720	101,848	542,819	149,900	231	10,360	3	10,725	
Corridor	0	67	121	0	0	0	0	2496	0	61459	66057	0	0	0	0	

Note: Highlighted TAZ's 100 through 102 and 110 through 124 represent South Liberty Parkway study corridor.

Appendix

Table D.2 2010 Socio-Economic Data

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	park	day care	mix use (res)	mix use (comm)	Special Gen
1	0	0	50	0	2,032	0	0	0	0	0	0	0	0	0	0	
2	0	0	49	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	180	0	0	0	0	0	0	1,984	0	0	0	0	0	
4	4	15	177	3	0	0	0	0	0	0	0	0	0	0	0	
5	0	13	63	0	0	0	0	0	0	0	0	0	0	0	0	
6	3	14	114	0	0	0	0	0	0	0	0	0	0	0	0	
7	0	2	103	0	0	0	0	0	0	0	0	0	0	0	0	
8	0	14	106	0	0	0	0	0	0	0	0	0	0	0	0	
9	0	2	59	0	0	0	0	0	0	0	0	0	0	0	0	
10	21	41	103	0	0	0	0	0	0	0	0	0	0	0	0	
11	0	3	257	0	0	0	0	0	0	0	0	0	0	0	0	
12	0	7	128	0	0	0	0	0	0	0	0	0	0	0	0	
13	0	5	69	56	0	3,000	0	0	0	0	0	0	0	0	0	
14	3	1	20	94	0	7,500	3,500	45,000	0	6,435	0	0	0	0	0	
15	5	5	86	0	0	0	0	0	0	0	0	0	0	0	0	
16	0	6	77	0	0	0	0	0	0	2,857	0	0	0	0	0	
17	0	5	100	0	0	0	0	0	0	0	0	0	0	0	0	
18	0	38	157	0	0	0	0	0	0	0	0	0	0	0	0	
19	1	0	474	0	12,000	5,000	0	0	0	0	0	0	0	0	0	
20	3	0	32	0	3,000	2,000	0	0	0	0	0	0	0	0	0	
21	0	0	100	0	0	0	18,000	0	0	0	0	0	0	0	0	
22	0	0	100	0	18,750	5,250	0	26,600	0	0	0	0	0	0	0	
23	0	6	249	0	5,000	2,000	450	0	0	0	0	0	0	0	0	
24	0	0	100	0	2,000	2,000	4,000	0	0	0	0	0	0	0	0	
25	0	0	0	0	2,500	1,500	40,000	25,000	0	0	0	0	0	0	0	
26	0	1	1	0	8,000	12,500	60,000	480,000	0	1,924	0	0	0	0	0	
27	0	0	5	0	1,500	1,000	0	0	0	0	0	0	0	0	0	
28	0	28	7	0	0	1,050	0	0	0	0	0	0	0	0	0	
29	0	3	42	0	0	0	0	13,260	0	4,275	0	0	0	0	0	
30	0	13	87	0	0	0	0	0	0	0	0	0	0	0	0	
31	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	
32	0	3	69	0	0	0	0	0	0	0	0	0	0	0	0	
33	0	2	35	0	0	0	0	0	0	0	0	0	0	0	0	
34	0	14	9	0	0	0	37,500	0	0	0	0	0	0	0	0	HM
35	0	18	72	0	3,000	0	2,000	0	0	0	0	0	0	0	0	
36	0	0	105	0	6,000	0	2,500	0	0	0	40,191	0	0	0	0	LH
37	0	6	295	119	2,800	10,756	2,500	0	0	0	0	37	0	0	0	
38	0	0	36	0	6,983	0	0	0	0	0	0	0	0	0	0	
39	0	1	167	232	5,000	4,000	2,500	0	0	0	0	0	0	0	0	
40	0	16	54	0	0	0	20,000	0	0	0	0	0	0	0	0	
41	0	3	10	0	0	0	0	0	0	0	0	0	0	0	0	SCV
42	0	0	350	0	0	0	0	0	0	0	0	800	0	0	0	SCV/SCES /HGC/SGH
43	0	0	60	0	128,800	45,000	17,500	0	0	0	0	0	0	0	0	
44	0	1	10	0	30,000	14,000	4,000	100,000	64,584	143,595	0	0	0	0	0	

Appendix

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	park	day care	mix use (res)	mix use (comm)	Special Gen
45	0	29	230	4	0	0	0	0	0	0	0	0	0	0	0	
46	0	8	487	0	0	0	0	0	0	0	0	0	0	0	0	
47	9	43	69	0	0	0	978	0	0	7,336	0	0	0	0	0	CGC
48	0	2	16	0	0	0	4,000	27,576	0	0	0	0	0	0	0	
49	0	0	75	0	0	0	0	0	0	0	0	0	0	0	0	
50	3	12	135	0	0	0	0	0	0	0	0	0	0	0	0	
51	3	30	267	0	0	0	0	3,645	0	3,931	0	0	0	1	7,200	
52	0	2	2	5	9,000	0	3,000	0	0	0	0	0	0	0	0	
53	1	3	0	50	0	0	1,868	4,301	0	0	0	0	0	0	0	
54	21	58	45	96	2,838	15,276	0	0	0	15,468	0	0	0	0	0	WJC
55	0	17	280	2	0	0	0	4,583	0	28,809	0	32	0	0	0	LCES
56	1	14	133	2	0	0	0	0	0	5,820	0	13	0	0	0	
57	14	50	215	5	0	0	0	0	0	0	0	0	0	0	0	
58	49	126	62	377	0	0	0	0	0	1,752	0	9	0	0	0	
59	27	66	40	132	0	0	0	0	3,006	12,222	0	0	0	0	0	G
60	4	15	4	84	138,009	8,318	15,714	2,013	0	62,559	0	0	0	0	0	
61	11	32	19	24	3,286	0	6,556	0	0	0	0	0	0	0	0	
62	2	27	10	12	0	0	0	0	0	0	0	0	0	0	0	JRS
63	0	4	149	223	5,909	0	158,840	0	0	2,121	0	0	0	0	0	
64	0	1	7	96	31,343	45,972	187,500	3,800	21,860	15,532	43,652	0	0	0	0	
65	0	0	3	0	400,000	9,500	75,000	2,369	12,398	8,809	0	0	0	0	0	
66	0	1	249	2	0	0	0	0	0	0	0	0	0	0	0	SCV
67	0	0	90	0	0	0	0	0	0	0	0	0	0	0	0	SCV
68	0	0	0	130	260,000	63,405	10,000	0	82,377	0	0	0	0	0	0	
69	0	53	82	160	149,496	65,426	100,060	0	0	7,885	0	0	4,960	0	0	HS/LA
70	0	4	9	0	183,254	5,744	32,500	0	0	2,924	0	0	0	0	0	PS
71	6	96	77	225	107,360	20,284	29,094	3,040	0	68,334	0	0	0	1	2,100	
72	1	26	15	15	0	0	0	0	0	0	0	0	0	0	0	
73	3	12	6	9	12,648	0	24,124	5,300	0	0	0	0	3,000	0	0	
74	0	0	0	3	27,006	13,304	40,523	0	0	0	0	0	0	0	0	
75	26	253	28	9	49,001	4,437	1,468	11,631	0	1,044	0	12	0	0	0	FES/RES
76	25	130	35	124	6,944	4,272	2,562	9,303	0	2,908	0	0	0	0	0	
77	28	91	24	113	50,000	7,000	0	150,269	0	2,986	0	0	2,400	0	0	
78	0	8	213	149	0	0	0	0	0	0	0	0	0	0	0	
79	0	4	146	0	10,000	0	10,000	0	0	0	0	0	0	0	0	LSES
80	2	13	101	0	0	0	0	0	0	0	0	112	0	0	0	
81	3	6	51	0	0	0	0	1,444	0	0	0	0	0	0	0	
82	1	11	75	0	0	0	0	0	0	1,248	0	0	0	0	0	
83	0	3	50	0	0	0	3,000	0	0	0	0	0	0	0	0	
84	0	0	200	0	14,000	0	0	0	0	0	0	0	0	0	0	
85	0	13	13	87	0	0	0	18,000	0	4,590	0	0	0	1	1,425	
86	0	296	126	163	0	9,668	0	0	0	0	0	0	0	0	0	MHES
87	0	5	207	0	0	0	0	2,724	0	5,826	0	0	0	0	0	
88	0	0	99	0	225,000	38,340	56,000	292,500	0	60,416	0	0	0	0	0	
89	0	108	307	0	0	0	0	0	0	0	0	23	0	0	0	
90	0	0	567	0	0	0	0	0	0	14,569	0	18	0	0	0	

Appendix

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	park	day care	mix use (res)	mix use (comm)	Special Gen
91	0	124	359	61	22,000	12,000	75,000	0	0	0	0	12	0	0	0	ADES
92	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
93	1	49	770	137	0	0	0	0	0	0	0	0	0	0	0	
94	8	118	413	242	0	7,722	0	0	0	49,868	27,054	0	0	0	0	
95	1	22	4	24	8,840	0	20,676	63,759	0	0	0	0	0	0	0	
96	0	0	0	98	0	0	0	0	0	0	0	0	0	0	0	
97	16	100	301	8	0	0	0	0	0	0	0	0	0	0	0	
98	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	MS
99	0	33	33	0	0	0	0	0	0	0	0	0	0	0	0	
100	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	
101	0	13	0	0	4,000	0	2,250	0	0	0	0	0	0	0	0	
102	0	88	152	0	15,000	2,000	2,250	0	0	16,270	66,057	0	0	0	0	
103	0	0	275	175	8,000	0	0	0	0	0	0	0	0	0	0	
104	0	5	140	0	8,000	0	3,000	0	0	0	0	0	0	0	0	
105	0	13	27	0	0	0	0	0	0	0	0	0	0	0	0	
106	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	
107	0	0	52	0	0	0	0	0	0	0	0	0	0	0	0	
108	0	63	62	234	8,000	0	5,000	157,500	0	0	0	0	0	0	0	
109	0	45	90	0	12,500	10,000	4,000	0	0	0	0	0	0	0	0	
110	0	3	7	0	6,000	4,500	0	0	0	0	0	0	0	0	0	
111	0	8	17	0	0	0	0	0	0	0	0	0	0	0	0	
112	0	14	56	0	10,000	0	5,000	0	0	0	0	0	0	0	0	
113	0	0	250	0	110,000	0	40,000	0	0	0	0	0	0	0	0	
114	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	
115	0	70	280	0	85,000	0	25,000	0	0	0	0	0	0	0	0	
116	0	90	30	0	50,000	0	30,000	0	0	0	0	0	0	0	0	
117	67	5	24	0	0	0	70,000	0	0	32,182	0	0	0	0	0	
118	0	0	0	0	0	0	90,000	70,000	0	0	0	0	0	0	0	
119	0	0	30	0	0	0	70,000	0	0	0	0	0	0	0	0	
120	0	0	0	0	0	0	60,000	45,000	0	0	0	0	0	0	0	
121	0	0	0	0	0	0	50,000	0	0	0	0	0	0	0	0	
122	0	0	0	0	0	0	70,000	0	0	9,555	0	0	0	0	0	
123	0	0	0	0	0	0	100,000	110,000	0	0	0	0	0	0	0	
124	0	0	0	0	200,000	50,000	0	0	0	3,452	0	0	0	0	0	
125	23	106	83	0	0	0	0	75,080	0	0	0	0	0	0	0	
126	35	21	3	175	12,648	17,430	5,952	3,474	0	0	0	0	0	1	3,196	
127	0	3	10	0	0	0	0	18,500	0	5,156	0	0	0	0	0	Ford
128	0	0	0	0	0	0	0	200,000	0	0	0	0	0	0	0	
129	0	24	96	0	0	0	0	0	0	0	0	0	0	0	0	
130	0	38	152	0	0	0	0	0	0	0	0	0	0	0	0	
131	0	14	56	0	0	0	0	0	0	0	0	0	0	0	0	
132	0	0	0	0	0	0	0	30,000	0	0	0	0	0	0	0	
133	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
134	16	32	32	0	0	0	0	80,000	0	0	0	0	0	0	0	
135	0	20	30	0	0	0	0	0	0	0	0	0	0	0	0	

Appendix

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	park	day care	mix use (res)	mix use (comm)	Special Gen
136	1	1,125	201	0	0	0	0	0	0	10,376	0	0	0	0	0	
137	21	3	2	0	0	0	0	9,520	0	572	0	0	0	0	0	HMW
138	0	2	1	0	112,808	79,648	0	291,557	14,016	0	0	0	0	0	0	WOF/OOF /HMW
139	39	45	16	0	0	4,680	0	800,000	0	2,648	0	0	0	0	0	
140	10	12	2	0	0	0	5,130	34,250	0	1,900	0	0	0	0	0	AS
141	2	17	16	0	0	0	0	1,500,000	0	0	0	0	0	0	0	
Study Area	519	4,282	13,709	3,958	2,595,255	615,482	1,710,495	4,720,998	198,241	630,138	176,954	1,068	10,360	4	13,921	
Liberty SL	315	2,379	7,416	2,766	2,006,894	358,847	1,602,787	1,558,554	101,848	542,819	149,900	268	10,360	3	10,725	
Corridor	67	291	974	0	480,000	56,500	614,500	225,000	0	61,459	66,057	0	0	0	0	

Note: Highlighted TAZ's 100 through 102 and 110 through 124 represent South Liberty Parkway study corridor.

Appendix

Table D.3 2025 Socio-Economic Data (in thousands)

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	park	day care	mix use (res)	mix use (comm)	Special Gen
1	0	0	375	0	2	0	0	0	0	0	0	0	0	0	0	
2	0	0	194	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	660	0	0	0	0	0	0	1	0	0	0	0	0	
4	12	46	532	8	0	0	0	0	0	0	0	0	0	0	0	
5	0	45	229	0	0	0	0	0	0	0	0	0	0	0	0	
6	8	44	369	0	0	0	0	0	0	0	0	0	0	0	0	
7	0	4	205	0	0	0	0	0	0	0	0	0	0	0	0	
8	0	45	354	0	0	0	0	0	0	0	0	0	0	0	0	
9	0	5	204	0	0	0	0	0	0	0	0	0	0	0	0	
10	61	123	309	0	0	0	0	0	0	0	0	0	0	0	0	
11	0	9	770	0	0	0	0	0	0	0	0	0	0	0	0	
12	0	14	255	0	0	0	0	0	0	0	0	0	0	0	0	
13	0	36	515	423	0	7	0	0	0	0	0	0	0	0	0	
14	3	1	20	94	0	17	7	105	0	6	0	0	0	0	0	
15	23	23	427	0	0	0	0	0	0	0	0	0	0	0	0	
16	0	23	306	0	0	0	0	0	0	2	0	0	0	0	0	
17	0	19	400	0	0	0	0	0	0	0	0	0	0	0	0	
18	0	165	679	0	0	0	0	0	0	0	0	0	0	0	0	
19	1	0	568	0	48	12	0	0	0	0	0	0	0	0	0	
20	5	0	64	0	10	5	0	0	0	0	0	0	0	0	0	
21	0	0	400	0	0	0	48	0	0	0	0	0	0	0	0	
22	0	0	140	0	52	10	0	26	0	0	0	0	0	0	0	
23	0	11	498	0	30	6	0	0	0	0	0	0	0	0	0	
24	0	0	400	0	8	4	4	0	0	0	0	0	0	0	0	
25	0	0	0	0	7	2	120	75	0	0	0	0	0	0	0	
26	0	2	2	0	24	30	180	480	0	1	0	0	0	0	0	
27	0	0	20	0	3	1	0	0	0	0	0	0	0	0	0	
28	0	84	21	0	0	0	0	0	0	0	0	0	0	0	0	
29	0	7	120	0	0	0	0	13	0	4	0	0	0	0	0	
30	0	30	195	0	0	0	0	0	0	0	0	0	0	0	0	
31	0	0	81	0	0	0	0	0	0	0	0	0	0	0	0	
32	0	3	93	0	0	0	0	0	0	0	0	0	0	0	0	
33	0	8	141	0	0	0	0	0	0	0	0	0	0	0	0	
34	0	45	30	0	0	0	125	0	0	0	0	0	0	0	0	HM
35	0	81	324	0	6	0	4	0	0	0	0	0	0	0	0	
36	0	0	420	0	18	0	6	0	0	0	141	0	0	0	0	LH
37	0	11	590	238	8	10	6	0	0	0	0	37	0	0	0	
38	0	0	72	0	6	0	0	0	0	0	0	0	0	0	0	
39	0	1	250	347	30	12	7	0	0	0	0	0	0	0	0	
40	0	96	323	0	0	0	60	0	0	0	0	0	0	0	0	
41	0	78	315	2638	0	0	183	0	0	0	0	0	0	0	0	
42	0	0	903	2096	137	0	0	0	0	0	0	800	0	0	0	SCES/ HGC/SG
43	0	0	225	0	128	67	37	0	0	0	0	0	0	0	0	

Appendix

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	park	day care	mix use (res)	mix use (comm)	Special Gen
44	0	1	10	0	45	18	9	225	258	143	0	0	0	0	0	
45	0	29	230	4	0	0	0	0	0	0	0	0	0	0	0	
46	0	11	708	0	0	0	0	0	0	0	0	0	0	0	0	
47	34	171	274	0	0	0	0	0	0	7	0	0	0	0	0	CGC
48	0	7	63	0	0	0	4	27	0	0	0	0	0	0	0	
49	0	0	275	0	0	0	0	0	0	0	0	0	0	0	0	
50	10	43	496	0	0	0	0	0	0	0	0	0	0	0	0	
51	27	300	2672	0	0	0	0	3	0	3	0	0	0	1	25	
52	0	3	3	10	14	0	7	0	0	0	0	0	0	0	0	
53	1	3	0	50	0	0	1	4	0	0	0	0	0	0	0	
54	21	57	45	95	2	15	0	0	0	15	0	0	0	0	0	WJC
55	0	17	280	2	0	0	0	4	0	28	0	32	0	0	0	LCES
56	1	14	133	2	0	0	0	0	0	5	0	13	0	0	0	
57	14	50	215	5	0	0	0	0	0	0	0	0	0	0	0	
58	49	126	62	376	0	0	0	0	0	1	0	9	0	0	0	
59	28	69	42	139	0	0	0	0	12	12	0	0	0	0	0	G
60	4	15	4	84	138	8	15	2	0	62	0	0	0	0	0	
61	11	32	19	24	3	0	6	0	0	0	0	0	0	0	0	
62	2	27	10	12	0	0	0	0	0	0	0	0	0	0	0	JRS
63	0	4	149	223	5	0	158	0	0	2	0	0	0	0	0	
64	0	2	10	137	31	45	750	3	87	15	153	0	0	0	0	
65	0	0	3	0	800	10	150	2	49	8	0	0	0	0	0	
66	0	1	276	5410	253	0	2170	494	0	0	0	0	0	0	0	
67	0	0	1965	2854	499	0	0	0	0	0	0	0	0	0	0	
68	0	0	0	200	260	63	10	0	329	0	0	0	0	0	0	
69	0	53	82	160	149	65	100	0	0	7	0	0	17	0	0	HS/LA
70	0	4	9	0	183	5	50	0	0	2	0	0	0	0	0	PS
71	6	96	77	225	107	20	29	3	0	68	0	0	0	1	7	
72	1	26	15	15	0	0	0	0	0	0	0	0	0	0	0	
73	3	12	6	9	12	0	24	5	0	0	0	0	10	0	0	
74	0	0	0	3	27	13	40	0	0	0	0	0	0	0	0	
75	26	253	28	9	49	4	1	11	0	1	0	12	0	0	0	FES/RES
76	25	130	35	124	6	4	2	9	0	2	0	0	0	0	0	
77	28	91	24	113	100	20	0	150	0	2	0	0	8	0	0	
78	0	8	213	149	0	0	0	0	0	0	0	0	0	0	0	
79	0	5	194	0	20	0	10	0	0	0	0	0	0	0	0	LSES
80	5	43	336	0	0	0	0	0	0	0	0	112	0	0	0	
81	7	15	127	0	0	0	0	1	0	0	0	0	0	0	0	
82	2	22	150	0	0	0	0	0	0	1	0	0	0	0	0	
83	0	6	116	0	0	0	5	0	0	0	0	0	0	0	0	
84	0	0	350	0	28	0	0	0	0	0	0	0	0	0	0	
85	0	51	51	347	0	0	0	18	0	4	0	0	0	1	5	
86	0	328	140	181	0	9	0	0	0	0	0	0	0	0	0	MHES
87	0	6	243	0	0	0	0	2	0	5	0	0	0	0	0	
88	0	0	180	0	250	38	80	390	0	60	0	0	0	0	0	
89	0	108	307	0	0	0	0	0	0	0	0	23	0	0	0	

Appendix

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	park	day care	mix use (res)	mix use (comm)	Special Gen
90	0	0	567	0	0	0	0	0	0	14	0	18	0	0	0	ADES
91	0	157	454	76	38	22	142	0	0	0	0	11	0	0	0	
92	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
93	1	49	770	137	0	0	0	0	0	0	0	0	0	0	0	
94	8	118	413	241	0	7	0	0	0	49	94	0	0	0	0	
95	1	22	4	24	8	0	20	63	0	0	0	0	0	0	0	
96	0	0	0	98	0	0	0	0	0	0	0	0	0	0	0	
97	19	117	353	8	0	0	0	0	0	0	0	0	0	0	0	MS
98	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	
99	0	32	32	0	0	0	0	0	0	0	0	0	0	0	0	
100	0	0	108	0	0	0	0	0	0	0	0	0	0	0	0	
101	0	39	0	0	12	0	4	0	0	0	0	0	0	0	0	
102	0	176	303	0	45	12	4	0	0	16	231	0	0	0	0	
103	0	0	305	194	20	0	0	0	0	0	0	0	0	0	0	
104	0	9	280	0	20	0	7	0	0	0	0	0	0	0	0	
105	0	33	66	0	0	0	0	0	0	0	0	0	0	0	0	
106	0	0	90	0	0	0	0	0	0	0	0	0	0	0	0	
107	0	0	97	0	0	0	0	0	0	0	0	0	0	0	0	
108	0	137	134	507	26	0	16	146	0	0	0	0	0	0	0	
109	0	450	900	0	25	25	10	0	0	0	0	0	0	0	0	
110	0	12	28	0	16	12	0	0	0	0	0	0	0	0	0	
111	0	8	16	0	0	0	0	0	0	0	0	0	0	0	0	
112	0	168	672	0	30	0	12	0	0	0	0	0	0	0	0	
113	0	0	250	0	110	0	40	0	0	0	0	0	0	0	0	
114	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	
115	0	100	400	0	120	0	40	0	0	0	0	0	0	0	0	
116	0	90	30	0	60	0	40	0	0	0	0	0	0	0	0	
117	71	4	19	0	0	0	120	0	0	32	0	0	0	0	0	
118	0	0	0	0	0	0	210	130	0	0	0	0	0	0	0	
119	0	0	30	0	0	0	120	0	0	0	0	0	0	0	0	
120	0	0	0	0	0	0	115	140	0	0	0	0	0	0	0	
121	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	
122	0	0	0	0	0	0	70	0	0	9	0	0	0	0	0	
123	0	0	0	0	0	0	220	110	0	0	0	0	0	0	0	
124	0	0	0	0	500	50	0	2	0	3	0	0	0	0	0	
125	23	106	83	0	0	0	0	75	0	0	0	0	0	0	0	
126	35	21	3	175	12	17	5	3	0	0	0	0	0	0	1	Ford
127	0	3	10	0	0	0	0	18	0	5	0	0	0	0	0	
128	0	0	0	0	0	0	0	550	0	0	0	0	0	0	0	
129	0	70	280	0	0	0	0	0	0	0	0	0	0	0	0	
130	0	78	312	0	0	0	0	0	0	0	0	0	0	0	0	
131	0	42	168	0	0	0	0	0	0	0	0	0	0	0	0	
132	0	0	0	0	0	0	0	71	0	0	0	0	0	0	0	
133	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
134	19	38	38	0	0	0	0	190	0	0	0	0	0	0	0	

Appendix

TAZ	SF LI RES (UNITS)	SF MI RES (UNITS)	SF HI RES (UNITS)	MF RES (UNITS)	COM NA (SF)	COM AUTO (SF)	OFFICE (SF)	INDUST (SF)	HOTEL (SF)	CHURCH (SF)	NURS (SF)	park	day care	mix use (res)	mix use (comm)	Special Gen
135	0	40	60	0	0	0	0	0	0	0	0	0	0	0	0	
136	1	1125	201	0	0	0	0	0	0	10	0	0	0	0	0	
137	21	3	2	0	0	0	0	9	0	0	0	0	0	0	0	HMW
138	0	2	1	0	112	79	0	291	56	0	0	0	0	0	0	WOF/OO F/ HMW
139	39	45	16	0	0	4	0	1500	0	2	0	0	0	0	0	
140	10	12	2	0	0	0	5	34	0	1	0	0	0	0	0	AS
141	2	17	16	0	0	0	0	2125	0	0	0	0	0	0	0	
Study Area	668	6,621	31,279	18,266	4,652	748	5,658	7,509	791	608	619	1,067	35	4	48	
Liberty	355	4,614	12,750	11,631	3,933	524	4,829	6,545	521	318	478	176	35	3	23	
SL Corridor	71	597	1,934	0	893	74	1,045	382	0	60	231	0	0	0	0	

Note: Highlighted TAZ's 100 through 102 and 110 through 124 represent South Liberty Parkway study corridor.

APPENDIX H:

SOUTH LIBERTY PARKWAY CORRIDOR TRIP TYPE PERCENTAGES

Appendix H Trip Type Percentages

Land Use Type	Trip Rate	% In	Trip Type Percentages									
			HW In %	HW Out %	WH In %	WH Out %	HO In %	HO Out %	OH In %	OH Out %	NHB In %	NHB Out %
Single Family Residential (Low Income Units)	0.6	60	0.0	4.4	34.9	0.0	0.0	65.7	46.2	0.0	18.9	30.0
Single Family Residential (Middle Income Units)	1.05	60	0.0	5.9	42.7	0.0	0.0	61.6	38.9	0.0	18.4	32.5
Single Family Residential (High Income Units)	1.17	60	0.0	6.9	46.8	0.0	0.0	57.1	34.0	0.0	19.2	36.0
Multi-Family Residential (Units)	1.05	67	0.0	5.9	42.7	0.0	0.0	61.6	38.9	0.0	18.4	32.5
Commercial Non-Auto Oriented (KSF)	5	55	4.0	0.0	0.0	34.0	65.0	0.0	0.0	50.0	31.0	16.0
Commercial Auto Oriented (KSF)	20	55	4.0	0.0	0.0	34.0	65.0	0.0	0.0	50.0	31.0	16.0
Office (KSF)	1.68	17	18.0	0.0	0.0	67.0	39.0	0.0	0.0	15.0	43.0	18.0
Industry (KSF)	0.88	12	40.0	0.0	0.0	80.0	19.0	0.0	0.0	7.0	41.0	13.0
Hotel (KSF)	0.71	49	10.0	0.0	0.0	34.0	10.0	0.0	0.0	33.0	80.0	33.0
Church (KSF)	0.66	54	25.0	0.0	0.0	25.0	25.0	0.0	0.0	25.0	50.0	50.0
Nursing Home (KSF)	0.23	64	25.0	0.0	0.0	25.0	25.0	0.0	0.0	25.0	50.0	50.0
Park (Acres)	0.06	41	15.1	0.0	0.0	3.7	25.4	0.0	0.0	46.3	59.5	50.0
Day Care (KSF)	13.2	47	6.7	0.0	0.0	60.0	34.7	0.0	0.0	20.0	58.6	20.0
Mixed Residential (Units)	0.62	67	0.0	4.5	35.9	0.0	0.0	46.2	32.7	0.0	31.4	49.3
Mixed Commercial (KSF)	4.82	50	4.0	0.0	0.0	34.0	65.0	0.0	0.0	50.0	31.0	16.0

KSF = 1,000 Square Feet of Floor Space
 HW = Home to Work
 WH = Work to Home
 HO = Home to Other
 OH = Other to Home
 NHB = Non-Home Based

APPENDIX I:

SOUTH LIBERTY PARKWAY CORRIDOR K-FACTORS

Appendix I K-Factors

Trip Type*	Origin Zones	Destination Zones	Factor	Trip Type	Origin Zones	Destination Zones	Factor
HBO	1-139,141-156,162-174	138	0.3	NHB	140	1-137,139,141-157, 162-174	0.6
NHB	1-156, 162-174	138	0.3	NHB	140	140	2.0
HBO	1-156,158, 162-174	140	0.6	HBO NHB	140	158	0.4
NHB	1-139, 141-156, 158, 162-174	140	0.6	HBO NHB	140	159-161	4.0
ALL	127	163-164	5.0	ALL	142-174	142-174	0.0
HBO NHB	138	1-139,141-156,162-174	0.3	HBW	157	138 & 140	0.5
HBW	138 & 140	158	0.5	HBO NHB	157	140	0.4
HBO NHB	138	159-161	80.0	HBO NHB	159-161	138	80.0
HBW	138 & 140	159-161	4.0	HBW	159-161	138 & 140	4.0
HBO	140	1-157,162-174	0.6	HBO NHB	159-161	140	4.0

*Trip Type: HBO=Home-Based Other HBW=Home-Based Work NHB=Non-Home Based

